

RECORD



Collection and Field Note Book

No. 50

(Nov. 30, 1957 - Jan. 26, 1958)

(38917 -- 39316)

	Pages
Thailand..... <i>p. 4-5</i> * 38917-38923	1-80
Specimens collected 8-11 * 38924-38941	
16-19 * 38942-38955	
24-39 * 38956-39039	
44-67 * 39040-39177	
78-79 * 39178	
Cambodia.....	80-87
Viet Nam.....	87-93
Philippines.....	94-99
Specimens collected 98-99 * 39180-39184	
Guam.....	98-143
Specimens collected 98-99 * 39185-39186	
106-109 * 39187-39200	
112-113 * 39201-39209	
116-119 * 39210-39231	
122-123 * 39232-39238	
126-133 * 39239-39264	
138-141 * 39265-39276	
Kwajalein. (<i>Marshall Is.</i>).....	144-145
Specimens collected 144-145 * 39277-39278	
Hawaiian Islands.....	146--170
Specimens collected 150-151 * 39279-39288	
154-155 * 39289-39295	
160-163 * 39296-39310	
168-169 * 39311-39312	

F. R. Fosberg

Virginia

Prince William County.....172-173
Specimens collected 172-173 * 39313-39316
(Manassas)

F. R. Folberg
Bonds 450

31477
-22-
-77-

31477 }
-22- }
-77- } include

3148

34056

34052

1052

Missing

F. R. Folsom
C. R. #1 -

12-1-11

Office Memorandum • UNITED STATES GOVERNMENT

vi

DATE:

FROM

Subject:

F. R. Følberg

3477

22

77

28772

53947

3717E

39056

29062

7-70 52

F. R. Forberg

Books #50

begin with

38917

and with # 39816



Standard Miniature Blank Book

No. 665 9½ x 6 120 Pages Units

No. 667 9½ x 6 200 Pages Units

No. 668 9½ x 6 300 Pages Units

Made in the Following Bindings

Journals, Day or Cash Books, Double S and Cts.

S. L. Ledgers, S and Cts.

Double Entry Ledgers

Records with Margin Line

When ordering give Number and Binding desired

Made in U. S. A.

A BOOKER & PEASE PRODUCT

1957 Thailand

1

Nov. 30 - road eastward along head of Gulf of ~~Tanin~~ Lian. Saline flats between the road and the sea are covered ~~by~~ locally by a purple *Suaeda* (*S. frutescens*?), more generally by mangroves, mostly *Avicennia*. The *Avicennia* is mostly only 1-2 m. tall and seems to be harvested regularly for wood - bundles of wood ranging from finger size to wrist size are piled along the road and different patches are of different average heights. Occasionally, especially farther east, are taller patches of *Rhizophora*, the stilt roots very low, appearing to be about 1 m. tall. In some areas the mangrove has been cleared and coconuts planted on windrows of soil.

The road forms the boundary between saline and non saline conditions. On the seaward side there is little cultivation, on the landward side all is cultivated or in canals which are intensively used for fishing for small fish.

1957 Thailand

Dec. 1 - Satahip - headlands covered by secondary scrub vegetation showing striking examples of wind grooving, especially radiating up from small cores and running up over the lower ridges.

Sides of broad ravines coming down to sea have south exposures covered by a low scrub, north exposures by scrubby tangled forests.

Dec. 1 Ko Kram (Island)

Flat coastal plain on side toward land, 1-5 m. above high tide. Covered by a few cultivated patches and much thicket and grass. The grass is in part a pure stand of *Pteropogon contortus*, the fruits twisted together in bunches (photo). Some of the openings are a mixture of *Imperata*, *Eupatorium*, *Pteropogon*, etc. The thickets are a tangle of small trees and shrubs, many of them semi-climbers, many very spiny.

Dec. 1 - Ko Kram (Island),

in ~~spiny~~ secondary thicket
on rather low flat ground.

38917

Jasminum
common

1 18

Aglaia

occasional

3 19

Amorphophallus

very local in shade

2 20

Phyllanthus

rare in ^{light} shade

3 21

occasional

3 22

occasional

2 ~~27~~

same in open grassy places

2 23

Heteropogon contortus
dominant locally

Dec. 3 n.e. Wang Noi

elongate spiny shrub.

low shrub, 1 m. tall.

petiole mottled.

erect shrub 0.7 m. tall.

slender shrub 2 m.
tallshrub 2.5 m. tall, leaves
slightly glaucous beneath.bunches of fruits
conspicuous with
axes twisted together.

Dec. 3 - Bus trip Bangkok to
Pukae

Central plain - rice land
submerged except tops of
leaves.

Aquatic plants less con-
spicuous after leaving
vicinity of Bangkok.

a few cult. patches of
Nelumbo (flowering).

Aquatic seen in flower:

Nymphaea sp.
Scirpus grossus
S. malaccensis
Cyperus

Zizyphus trees on road
embankment said to be from
seeds thrown from cars.
Pithecellobium also?

Typha nurseries beyond Bangkok
Beyond this the water is not
so high and a dark clay-like
soil is exposed

Dec 3

Dec. 3 Pukae Botanical garden -

Low land along river,
a dark soil, gumwood (?).
Gentle slopes are very
stony (lithosol). Low hill
or knoll covered by bushy
secondary thicket, choked
around the edges with
Eupatorium, *Broussonetia*,
Xanthoxylum, *Phragmites*, etc.
Coesalpinia etc.

(photo of termite mound beyond Pukae)

Dec. 3 - area around Laffan
an old lake bed of black
soil, underlain by mud.
Mostly in rice, quite
wet at this season.

Widely scattered trees,
spreading crowns and low
branching. *Borassus* common.
Coconuts. *Samanea*, *Dalmanis*,
Zizyphus, *Pithecellobium*,
Lumnitzera, *Mangifera*.

Some pasture and ~~recently~~
weedy fields, probably
fallow, near city. Termite
mounds.

Limestone hills covered by
sparse to ~~as~~ dense scrub
mainly bamboo, scattered
bare trees.

Dec. 3 - Pakae, northeast
of Banaburi

in edges of thicket on low
hill of disintegrating rock.

38924 *Ipomoea*

2 on bare ground around

25 *Sida*

occasional around

2 26 *Phragmites karka*

common in

2 27 *Solanum* aff. *verbascifolium*

occasional in

2 28 *Boerhavia diffusa*

common around

(apparently same population as
nos. 38931, 38936)

1 29 *Ipomoea*

rare in

2 30 (gran)

occasional in

~~31 *Boerhavia diffusa*~~

same - ~~in~~ in open cleared field
on low hill of disintegrating rock.

3 31 *Boerhavia diffusa*

abundant ~~in~~

(apparently same population as nos. 38928,

38936)

1 32 *Abutilon asiaticum*

occasional

2 33 *Andropogon*

common

prostrate, corolla white

suffrutescent herb; flowers
orange.

canes 3 m. tall; panicle
fusiform in general shape.
bronz-green.

shrub 2 m. tall; leaves
pale green beneath; flowers
white; fruit green.

prostrate, forming a broad
mat, leaves pale green
beneath; flowers pink,
stamens mostly 2.

twining in tall weedy
growth; corolla tube campanulate,
white, ~~stamen~~ limb purple.

stamens straight, stigma capitate.
sprawling, elongate to
2-3 m.

prostrate to somewhat
ascending; flowers pink,
stamens 2; leaves ~~at~~ very
pale beneath.

caespitose; culms almost erect

38934 *Biophytum*

1 rare

3 35 *Emilia sonchifolia*
occasional locally2 36 *Boerhavia diffusa*
common (apparently
same population as nos. 38928, 38931)

Dec. 3 - Lophuri

waste place along street

2 37 *Portulaca quadrifida* L.
common locally in

Dec. 3 - 10 km. east of Chainat

3 38 *Oryza sativa* var. *spontanea*
very common in edges of
wet rice fieldsDec. 3 - Chainat Dam, Chao
Phaya2 39 (unc.)
stone embankment of inside
reservoir, flooded at high waterDec. 3 - northeast of Wang Noi.
Central Plain

mud edges of ditch along rice field

1 40 (scrub)

1 41 *Monochoria*
commonflowers purple, not much
exceeding involucre
ascending, leaves whitish
beneath, flowers pink,
stamens mostly 2.)prostrate, purplish, fleshy;
~~flowers~~ leaves opposite;
flowers yellow. petals 4, stamens
about 8.

culms ascending

prostrate, extensive; flower
white; fruit immature.

prostrate; flowers white

erect; flowers bright
purplish blue.

Dec. 3 - Bus trip from Lopburi to Chainat

The land very gradually rises after leaving the very flat lake bed area of Saraburi (about 200') to a maximum, on the road, of about 500', before the descent to the Central Plain at Chainat starts.

As the land rises cultivation becomes less. The scattered trees more abundant until thickets and patches of open forest form a mosaic with patches of savanna and cultivation.

Many kinds of trees are involved, including *Pipterocarpus alatus* and *Corypha umbraculifera*.

The latter is locally common on the highest part of the road and most of the larger ^{or} *Corypha* trees are in flower, a magnificent sight. A few were already past flowering and dying.

As the descent starts cultivation increases. This area is a cooperative home-steading project and is being cleared. The govt. ~~to~~ loans money to start, and

assigns a family 5 hectares of land, which becomes family property after 10 years of cultivation.

The hills from Lopburi almost to the edge of the plain are of limestone, fantastically eroded into vertical fluted lapies. The slopes of these are covered by woods in various stages of degradation. Some are covered by little but shiny bamboo, others with loose scrub, some with denser scrub. One was noticed with some grass on top, but with scattered bushes or trees. The few hills with even scrub forest are being actively exploited for charcoal.

The nearest hill to the Central plain seems to be of sandstone, judging by the amount of sand at the base, as well as by its non abrupt appearance.

Bamboo is prominent in all landscapes. In places it forms veritable barbed wire entanglements.

Dec. 4 Chainat Daen
Floating islands of *Pomelos*
aquaticus cult. on board (photo).

Dec. 4 - Nakhon Sawan
teak logs being assembled
in rafts (photo).

In market - Durian, Tangerine
Apples, ~~as~~ bitter orange,
Pachyrhizus erosus, *Pomelos*
mangosteen

Dec. 4 Ban Daen, Nakhonsawan

Abrupt jagged hills of
massive limestone.

Steeper slopes sparsely
vegetated, lower slopes wooded.
Many characteristic shrubs
a cereoid *Euphorbia*, *Dracaena* sp.,
Sphenoderma, *Premna*, *Bridelia*,
etc. (photo)

Dec. 4 - Talok Banta
remnants of old forest.

~~Dec. 4 Kamphaeng~~ ~~hot~~

Dec. 4 - Chainat to Nakhon
sawan - Granite hills
with thin latosolic
soil near road - soil
on flat ground rather
poor, some under culti-
vation, some in thicket.

After leaving hills
most of land is in
rice, with scattered
trees and termite mounds.

- Nakhonsawan to
Tak - rather sterile
soil for some distance
with thickets, some
cultivation. Then
an isolated range
of limestone hills.

Much of the country
degraded to thickets
of spiny bamboos.

Beyond Banphot Chissai
mainly flat country,
~~for~~ formerly evidently
in mixed deciduous
forest, cleared or degraded
to varying extents.

Degradation here
takes an unusual
form - the shrubs and
small trees are taken
out for charcoal, leaving
more or less the large
trees. These, locally, are
dipterocarps (*Piptocarpaceae*
sp., *Shorea* sp.), locally
Lagerstroemia, and
many others. The
areas where the trees
are very sparse are
(54.20)

Dec. 4 - Nak^{hon} Sawan, —
roadside

Chao Phraya R. —
30 m.

38942 *Alternanthera sessilis*?

43 *Tribulus cistoides* L.
common

~~44 *Sphenodesmus*~~

Dec. 4 Ban Daen, northwest
of Nak^{hon} Sawan
on steep jagged hills
of fluted limestone

50-100 m.

44 *Sphenodesmus*
occasional

45 *Hedyotis*
common in crevices

46 *Premna*
common

47 *Premna*
common

48 *Bridelia*
common

49 *Trichosanthes*
common

50 *Achyranthes*
~~common~~ on ledges

prostrate, forming
a mat.

prostrate, flowers
petals yellow, less than
1 cm. long.

shrub 2 m. tall,
bracts and calyx pale green.
all plants seen completely
dried.

shrub 1 m. tall,
fruit green.

shrub 1.5 m. tall,
flowers pale green,
scarcely any odor.

shrub, elongate branches;
leaves glaucous beneath;
fruit immature.

wine, climbing in bushes
and on rocks. flowers white,
fruit red, soft when ripe,
ripening from apical end.
erect.

Dec. 4 Talok Bartr, ~~to km~~
near Khana, 60 km. south
east of Kam Phaeng Phet
cleared flat land
along road.

38951 Phaseolus

2 52 ~~2 52~~ Pentacme siamensis (Miq.) Kuny

2 53 ~~2 53~~ Hedysotis
common under trees

1 54 Dipterocarpus obtusifolia
the remaining from former forest

4 55 Dec. 4 - Kam Phaeng Phet, ^{mae} Ping (River)
Foranthus
parasitic on mango tree

50 m.



~~mae~~ twiner; flowers with
maroon calyx and standard,
yellow wings, pale green
keel.

tree, sterile.

erect; flowers white.

tree 25 m. tall, ~~the~~ bark
longitudinally fissured
into ridges; leaves,
stipules and corolla from
ground beneath tree.

70 m.

woody plant about 1 m.
long, branched; corollas
laterally compressed,
tube coral red, lobes
yellow with green
area near base.

td. from p. 15) mostly planted to rice. Where somewhat denser there is a grass ground cover, rather tall (1 m. l.) with occasional clumps of *Themeda gigantea* up to 2 m. or more. Much of this is rather choked by brush, saplings, bamboos etc. In other areas, more open, there is conspicuous regeneration of *Dipterocarpus*, *Shorea*, etc. with little or no undergrowth.

In places, especially just south of bridge over Ping River, are areas of open or thin forest that have been little changed, with many very large buttressed trees. This forest is irregular, with considerable undergrowth, & in places rather open. Nowhere is the canopy complete.

This forest is all probably burned over quite often but shows few clear signs of it.

Dec. 5 - Ban Tak.
Village with large trees old cult. ground, bottom land (photos).

Dec. 5 ^{2 km.} n. of Rahaeng
dry forest. (photos)
degraded

Dec. 5 Ban Masalike ^{50 km.} n. of Tak
Old weathered low granite knobs protruding from plain - very degraded dry deciduous forest (photos). very eroded.

~~Ban Hong~~

Dec. 5 - from Tak to Thoen

The route lies mostly over low rolling hills covered by open forest. Some cultivation ~~is~~ along streams, but soil elsewhere very thin or else of a coarse sand or fine gravel derived from granite. Low hills covered by quartzite pebbles and cobbles embedded in clay soil, this almost all eroded away leaving a sort of pavement.

The forest varies some in height and density but is scrubby at best and seldom has the trees touching, sometimes very open. Grass or herbs and low shrubs between, some large shrubs. *Cycas saemneris* common.

The forest is a very degraded "deciduous dipterocarp" type, several dipterocarps common but also various other trees.

The whole area

seems to be burned frequently in the dry seasons and is also heavily grazed.

North of MacPhail there is a lower area of completely or almost completely cleared land, some in use, some in thicket of various stages of development.

The then gives way to scrubby forest again ~~or~~ partly clothed by spring bamboo.

A range of wooded hills to the east ~~to the~~ from north of MacPhail at least to Thoen which does not show on map.

Dec. 5 - Ban Tak (Rahaeng),
north of Tak ^{Ma}Ping (River)
around thickets and
garden patches in village
(lab.)

38956

1

2 57 *Plumbago zeylanica* L.2 58 *Urena lobata* L.2 59 *Urena*
common

Dec. 5 - 2 km. n. of Ban Tak
(Rahaeng), north of Tak ^{Ma}Ping (River)
in dry sparse scrubby
woodland on thin stony soil.

1 60

grass

common in openings.

badly grazed and trampled.

3 61

Paronychia
occasional

4 62

Evolvulus

occasional

1 63

Euphorbia

rare

1 64

Commelina?

rare

5 65

Cycas siamensis
common locally

2 66

Cycas siamensis
common locally

100 m.

corolla pink, end of lip
maroon. plant with little
or no odor.

elongate herb; corollas
white.

herb 1 m. tall, flowers

rose pink.

herb 1-2 m. tall; flowers
bright rose pink.

120 m.

small dense tufts.

flowers pinkish

flowers blue

grass appendage white.

stem fleshy, bronze color.

inflorescence already dry.

stem about 5 dm. tall, 12 cm. thick.
old leaf bases charred; cone
immature.

stem about 3 dm. tall, 12 cm. thick,
old leaf bases charred.

38947 *Cycas siamensis*
common

1 68 (leg.)

2 69 *Boerhaavia*?
common

4 70 *Helicteres*
very common

1 71 *Eupatorium odoratum*
abundant generally

1 72 *Polypodium*
in open, full sun.

1 73 (anon.)

1 74 *Uraria*
rare

4 75 *Grewia*
common

1 76 *Curcuma*
occasional, mostly stem.

2 77 (anon.)
occasional

4 78 *Ternstroemia*?

Dec. 5 - Ban Masalike, 50 km.
n. of Tak, near ^{nee} Wang River)
in very open woodland
on and around weathered

1 79 *Hedyotis*
granite boulders, coarse soil

2 80 *Cassia chamaecrista*?

2 81 *Lindernia*

very young plants with
"phycomorpha", ~~some~~
subterranean stem
bulbous, roots fleshy.
~~tree~~ small tree or large
shrub.

erect

suffrutescent herb, stem
ascending to spreading;
flowers purple.
herb 1-1.5 m. tall.
flowers lavender. fragrant.

fruit red.

bracts purplish

low shrub up to 0.6 m. tall.

flowers violet

140 m.



flowers white.

flowers yellow, calyx maroon.

flowers purple and white.

38982 (ascl.)

2

occasional, climbing
in bushes.1 83 *Terminalia alata*
common1 84 *Lespedeza*
commonDec. 5 - Thoen ^{Ma} Wang (River)

85

2 85 *Stereulia pexa*
in village, probably
spontaneous.Dec. 5 - mountains between
Thoen and Ilo4 86 *Desmodium*
occasional on bare road cuts

Dec. 5 - Ilo

2 87 *Lalix*
common along streamDec. 5 - about 20 km. south
of Ban Hong, about 70 km. south
of ^{Chiang} Mai

open Dry dipterocarp forest

3 88 *Elephantopus*
common on open soil1 89 (leg.)
occasional in opening1 90 *Verbena*
rare in openingvine with pale green
leaves, very glaucous
fruit
small tree

slender shrub

150 m

small tree ~~and~~ flowers
yellow, turning deep
orange

580 m

1700

shrub branched at
base; flowers blue-purple
and white.

480 m.

small tree

430 m

1400

flowers rose purple

flowers magenta

- 38991 *Sida cordifolia* L. det. Fernald, 1952
 3 common on bare soil in open
 + 92 *Graphalium*
 occasional in opening
 1 93 *Bridelia*
 2 94 *Dipterocarpus obtusifolius*
 common

Dec. 5 - west from Thoen
 the low ground is
 cultivated, slightly
 higher ground is
 in thicket and very
 degraded forest, this
 rather open. Ascending
 into the mountains
 the forest rapidly
 becomes more dense
 and much more
 luxuriant in aspect,
 a tall monsoon type
 forest with straight
 clear trunks but
 without a complete
 canopy, no very
 definite layering
 but with rather
 dense undergrowth.

erect; flowers orange

flowers deep purple

small tree; ripe fruit
 black.

trees to 20 m. tall; leaves,
 stipules, flowers, and
 fruit picked up on
 ground under trees;
 corolla pale pink,
 lobes rose pink within,
 with unpleasant odor.

for
 been
 some
 cropping

locally on steep slope
 a tall arching bamboo
 forms thickets. The
 forest is at this
 season very green,
 but is said to be
 deciduous a little
 later. Some dipterocarps
 much *Lagerströmia*
 (hot). Trees to 30+ m. tall.

Coming down somewhat
 into a broad flat
 valley, cultivation
 becomes locally dominant,
 the forest is open and
 of small stature, drier
 than in mountains, has
 suffered much from fire.
 From Ban Hong north there
 is much cultivation.

Dec. 6 - ridge leading
up to Boah~~ka~~, east slope
of Doi ~~Latet~~^{Suthep}, west of Chiang Mai

- in thick ~~forest~~ broadleaf
evergreen forest, mainly
Fagaceae

38995

Ardisia

rare

3 96

Lithocarpus
common

- on grassy ridge
with abundant
scattered trees and shrubs,

1 97

Lygodium flexuosum

3 98

~~Lathraea~~ sachee

very local

3 99

Polygonum chinense
occasional in margin
of forest

39000

(germes.) (L. tenebrum?)

rare on open

1 01

Sonnchilla

rare

3 02

Aeginetia
common

1 03

(Melast.)

rare on bare soil at edge of trail

1 04

Justicia?

occasional

2 05

Justicia?

occasional

3 06

Hedyotis

occasional

1200 m

unbranched, erect,
1 m tall, fruits scarlet.
tree 10 m. tall, fruiting
twigs lying on ground.

1200-1400 m.

showing evidence of fire.

climbing on shrubs
culms ascending
to erect.

decumbent to ascending,
flowers white, fruiting
calyx enlarged jelly-like
rosette flat on ground,
calyx maroon, fruit yellow.
calyx red.

erect; flower deep purple.

flowers pink.

flowers blue

corolla pink, upper lip
edged with maroon
erect, leaves stiff, dark green
above, white beneath, flowers white.

- ~~389~~
 39007 *Osteochloa*
 common
 2
 3 08 (lab.)
 common
 2 09 *Anaphalis*
 occasional
 2 10 *Thelypteris*?
 common
 1 11 (herb)
 2 12 *Hydrocotyle*
 occasional in edges of woods
 13 *Ophiopogon*
 occasional

~~wooded slope~~
 Dec. 6 - Boakha, lower summit
 on east
 slope of Doi Inthep, west
 of Chiang Mai
 in open woodland with
 grass, showing evidence
 of fire.

- 1 14 *Begonia siamensis*?
 on moist shaded slope
 3 15 *arecastrum*
 locally common
 2 16 *Vaccinium*
 epiphytic
 2 17 *Codonopsis*
 common climbing on grass
 and shrubs

shrub 1-2 m. tall,
 petals rose pink; fruiting
 - calyx reddish.
 erect, 1-2 m. tall; flowers
 white.
 involucre white, dull;
 corolla yellow.

flowers yellow,
 anthers dark brown.

fruits fleshy, globose,
 bright blue.

1700m

fleshy, leaves blotched
 red and green beneath.
 erect

shrub, corolla tubular,
 very slightly dilated
 upward, constricted below
 lobes, not fleshy, coral
 scarlet, lobes green.
 lactiferous twines, stems
 maroon, leaves pale; calyx
 maroon, fruit black.

- 39018 *Carex baccans*
rare
- 3 19 *Heliconia*
common
- 2 20 *Dianella*
occasional
- 1 21 *Peperomia reflexa*
epiphytic, rare
- 4 22 *Blumea*
common
- 3 23 *Gleichenia linearis* ^{var.} *ferruginea*
common
- 4 24 *Indigofera*
occasional
- 2 25 *Loranthus*
rare, parasitic
- 5 26 *Polypodium*
common, epiphytic on tree trunks
- 1 27 (orchid)
common, epiphytic on tree trunks
- 2 28 *Columnnea* (or *Declynanthus*)
occasional epiphytic
- 4 29 *Vittaria*
occasional, epiphytic
- 4 30 *Trichomanes*
very local, epiphytic on tree trunks
- 2 31 *Mucuna* (or *Hydrolobium*)
common

- erect, perianth deep
- range - red, fleshy.
small tree; fruit
immature
erect, leaves with
scabrous margins,
fruits globose, dark
purplish blue, fleshy.
fleshy
- erect herb 1-1.5 m. tall,
- disk yellow.
low, not forming
notable tangles, pinnae
glaucous beneath.
- shrub 1.5 m. tall, leaves
distichous, inflorescences
arising from plane
of leafy branch.
fruit glutinous within,
skin slipping off.
- ~~mostly~~ fronds mostly
dry at this season.
leaves fleshy, appressed
to bark.
- flowers brilliant scarlet,
fruit elongate, linear.
- pendent, leaves ~~erect~~
^{erect} from dryness.
leaves curled from dryness.
- vine climbing over bushes,
inflorescence pendent, often
covered with ants, bracts mauve,
calyx purple, corolla blackish purple.

- 39034 Andropogon
2 dominant grass in
2 33 (grass)
common
3 34 Lithocarpus
common
2 35 Lithocarpus
common
2 36 Lithocarpus
common
2 37 Pieris
common
4 38 Pieris
common

Dec. 4 - lower ^{south} slopes of
Doi Inthanon, west of Chiang Mai
1 39 Melanorrhoea
very common in ^{open} dry
deciduous forest

Dec. 6 - Doi Inthanon
The lower slopes, below
about 3500' are covered by
a rather sparse scrubby
deciduous forest with
dipterocarpaceae common.
This seems to suffer from
continuous fires. Much
regeneration locally.
Few large trees. In upper
parts of this are many
large Castanopsis with

erect to ascending

erect

small tree

small tree; flowers
~~white~~ with unpleasant odor.
small tree, fruits from
ground.

small tree fruit
immature
small tree

600 m.

small tree; flowers
white; fruiting calyx
scarlet, becoming so
very young.

tall clear trunks and
spreading crowns. Some
ravines here are rather
moist and there are
flowing streams. Above
3500' the forest changes to
an evergreen type, dominated
by many kinds of oaks,
but with various other
tree genera. In ravines
and on some slopes this is
dense, with canopy and

undergrowth. Generally, the undergrowth is lacking and the canopy irregular. On ridges the trees are sparser in places so scattered that the aspect is of woodland or even savanna-woodland with tall grass, especially *Andropogon* sp. and some shrubs, ferns, etc. Many interesting herbs. Above 5000' this forest becomes much more scrubby. Epiphytes become more common and include *Hymenophyllum*, *Vittaria*, and other ferns, as well as much moss and many orchids. *Gleichenia linearis* is common in open places. There are open grassy areas with rather few trees. The general height of trees here is perhaps 8 to 15 m. The color is dull dark green.

The moisture seems to ^{become} more abundant with altitude. Fires are said to sweep this forest annually, and ~~the~~ charred logs, stumps, etc. seem to bear this out, as well as

the lack of undergrowth and general ~~stature~~ ~~and~~ physiognomy of the forest. A few pines on the extreme summit.

A small cycad with only one or two leaves seen, not commonly at about 3000'.

Dec. 7 - Chiang Mai To Nan, Pa
Road skirts edges of
main area of rice culti-
vation. Low rolling ground
has scrubby growth
and thickets, some bamboo,
obviously, judging by
regeneration of and
scattered persisting trees
formerly deciduous dipterocarp
forest. Patches of this remain
in a degraded condition. Oak
is common, both in patches
of forest and around villages.

Finally, leaving the
plain and entering
hilly country the forest
changes to "moist upper
mixed deciduous forest."

This is also much degraded,
draped with vines, with
abundant bamboo in
understory. At ~~Chiang Mai~~
at 1250' is a sizeable tea
plantation on slopes, shaded
by *Gliricidia sepium*. On the
flat bottom land oranges are
planted.

The common understory bamboo
is *Oxytenanthera*. It is encouraged
by burning. Indicates good
soil for tea. Also ~~for~~ such areas
are farmed for dry land rice
cultivation. Cut close to

ground and allowed to
dry and burn.

Tea plantation here dates
from just after the war.

Canopy walls are
wooded with a
conspicuous grass
understory. ~~to~~ *Oxytenanthera*
also common in many
places. At about 1700'
Dendrocalamus is very
abundant in places
forming a thick forest.

Dec. 8 - Huey Tard 2900'

Photos of ~~the~~ forest with
conspicuous *Dipterocarpus*
costatus with tall white
trunks and spreading crowns.

Steep slopes here partly
covered by forest, partly in
tea plantations, the plantations
mostly on rounded spurs,
ravines wooded and containing
small streams. The forest
is tall, uneven, with generally
a full canopy and many lianas.
Trees perhaps 30 m tall.

Higher on ridges this forest
is replaced by an evergreen
moist oak forest. This is
apparently burned frequently
as undergrowth is sparse & absent.

Dec. 7 - ~~Kang Pan Tard~~ ^{Kang Pan Tard} ~~510-750 m.~~
 up to hill station ~~Chang~~ ^{Huey Tard}
 in ravine with moist
 deciduous forest.

39040

2

Ipomoea cordata

very common in weedy place

2

41

(file)

in understory

2

42

*Helaginella*on dry rock cut above
trail, wet in rainy season

3

43

*Helaginella*on dry rock cut above trail
wet in rainy season

5

44

*Helaginella*abundant on cut bank
of trail

2

45

Angiopteris

rare near bottom of ravine

3

46

Helaginella vogelii? Spring

common along trail

4

47

Helaginella

common on wet banks

3

48

*Maesa*gregarious on steep ~~wall~~ slope

1

49

Lonicilla?

rare on bare road cuts

3

50

Eulalia?dominant in ground
layer in open forest

2

51

Argyria

rare along trail

from the Raining, Chiang Dao,
~~Kang Pan Tard~~ ^{Huey Tard}

twiner - climbing on bushes,
 flowers scarlet.

small tree, leaves
 glaucous beneath.

plant closely adherent
 to substratum.

vegetative plant prostrate,
 fruiting branches erect.

erect.

fronds ascending, 3 m. long,
 petiole and rachis with
 longitudinal white marks,
 glabrous.

stem elongate, trailing,
 leaves iridescent.

drooping spikes compressed

small slender tree
 flowers white.

branches elongate
 fruiting culms erect,
 1 m. tall, spikes reddish.
 vine, flowers
 rose purple.

~~Dec 7~~
39052 *Lycanthus*

3 53 *Borreria laevis* (Lam.) Griseb.
~~Dec 7~~ rare along trail
53a *Lycanthus*

Dec. 7 - Ban Palat

Ma Chany Mai

34 km. n. of Chiang Mai

in drained rice fields

2 54 (grass)

2 55 *Marsilea*
common

3 56 *Zizyphus*
along road

Dec. 8 - Huey Tard, ~~near~~ mountains southwest of Chiang Dao
along paths near small villages

4 57 *Sambucus*

4 58 *Dioscorea* sp. ? L.

rare in weedy thicket

3 59 *Elaeagnus*
common

3 60 *Isachne* ?
common in thicket

3 61 *Solanum*
in thicket

4 62
occasional

802 m.

↓

dense clump, leaves
purplish; flowers white.

350 m.

↓

small tree, flowers
white, fruit immature.

950 m.

↓

erect, 3 m. tall, flowers
white, some modified to
yellow glands. "sapan ha" (Thai)
twines, twining to right.

"man" (Northern Thai)
scandent shrub, flowers
cream color; "malot", Northern Thai.

elongate to 3-4 m. forming
tangles.

shrub 3 m. tall, flowers
white, fruit immature.

"fa pang" (Northern Thai)

~~erect~~ slender shrub,
branches elongate, flowers yellow.

- 39063 Solanum
occasional
3 64 Spilanthes
common
3 65 Eryngium foetidum L.
edges of cultivated patches
3 66 Lida acuta?
common
3 67 (Rabate)
common
3 68 Drymaria cordata Willd.
common

same -

wet wooded
ravine, thin soil on
granite.

- 2 69 Cissus?
common
3 70 Ficus
2 71 Parleria?
common in wet bottom
3 72 Ficus
lower story - shrub
in ravine bottom
2 73 Pariscum
wet ravine bottom
2 74 (Commel.)
common in wet bottom of ravine
2 75 Pipturus
common in wet bottom

- shrub 2 m. tall, flowers
purplish; fruit red.
- spreading ~~can~~ herb,
flowers pale yellow.
- odor very bad; used
in cooking.
branches distichously
arranged.
- aromatic herb, flowers
yellow and maroon.
- "horn peng" (Northern Thai)
plant more or less
prostrate, ~~erect~~ branchy
bearing cymes erect;
fruiting pedicels viscosous,
adnucous.

- woody vine, climbing
- in trees; fruit immature.
tree 20 m. tall; lvs green,
globose.
- erect herb, 1 m. tall;
flower violet.
- drooping elongate shrub
w/ figs reddish.

- erect from prostrate stem,
fruit bluish.
- tangled shrub fruiting
receptacle fleshy white.

Dec. 8 - slopes above
Kuey Tard, mountains southwest of Chiang Mai
~~in~~ on wooded ridge.

- 39076 *Pratia* ^{shades}
common on bare spots on
ridge.
- 2 77 *Davallia*
common on rocky banks
and rocks.
- 1 78 *Lacciosiphon*
~~open~~ bare soil on ridges
- 1 79 *Helaginella*
common on bare soil
- 2 80 *Lindernia*
common on bare soil
- 2 81 (grass)
common on rocky place
- 2 82 *Fraxinus*
parasitic on *Laurus*
- 2 83 *Wendlandia paniculata* DC.
occasional
- 2 84 *Argyria*
occasional
- 1 85 *Eurya*
occasional.
- 1 86 *Codonopsis*
occasional
- 2 87 (Leg.)
occasional, climbing
in trees.
- 4 88 *Peristrophe*
occasional
- 2 89 *Castanopsis*
common.

300-1300 m.

prostrate, fruit hard
red.

fronds all dry, very
loosely articulated to
rhizome.

corolla white limb
purple above.

understory tree

twines flowers rose purple

small understory tree
flowers white.

— vine, flowers white,
fruit black.
— vine, bracts pale green.

erect herb, flowers
purple.

— tree 20 m. tall, fruits
from ground.

- 39090 (grass)
in water in thin shade
- 91 *Lonerillo*
rare on bare soil
- 92 *Panicum*
occasional along trail
- 2 93 *Torenia*
occasional
- 94 *Paspalum*
rare along trail
- 3 95 *Viburnum*
occasional in understory
- 96 (lab.)
rare
- 2 97 *Miconium?*
rare in understory
- 2 98 *Thelypteris*
occasional
- 3 99 *Dalbergia*
common
- 39100 (Conv.)
rare in understory
- 3 01 *Impatiens*
common
- 2 02 *Thelypteris*
very common
- 2 03 *Coleus*
common
- 04 ~~*Oreochloa*~~
~~common in st~~
- 2 04 *Asparagus*
occasional in open woods
- 4 05 *Styrac benzoides*
common in understory

flowers pink.

flowers white - purple
within

shrub 3 m. tall, bud only.

flowers lavender.

shrub 2 m. tall
bud only.

shrub 2.5 m. tall.

twines, fruits fleshy,
reddish, immature.
flowers pink.

erect

~~erect~~

plant arching; fruit orange

small tree.

- 39104 (grass)
 2 occasional
 1 07 Habenaria
 rare, terrestrial
 1 08 Crotalaria
 2 09 Phlomis
 occasional
 3 10 Humata
 occasional, epiphytic
 1 11 Adiantum
 rare
 1 12 Clerodendrum
 rare
 2 13 Asystasia
 occasional
 4 14 (rub.)
 locally common
 3 15 Pea
 occasional
 3 16 Pteris
 occasional
 3 17 Cordonopsis
 rare
 1 18 Thunbergia coccinea
 rare
 1 19 Lianthus
 occasional
 2 20 ~~Triumfetta~~
 in edge of forest
 3 21 Triumfetta
 in edge of forest
 1 22 Castanopsis

erect
 - pale immature
 erect, flowers yellow;
 fruit orange.

shrub, inflorescence white.

erect, flowers
 - pale lavender.
 flowers white.

herb to 0.7 m. tall,
 fruit black when ripe.

wine-like, flowers white.

wine-like herb, flower
 red, yellow in throat.

herb 1 m. tall.

herb 1 m. tall

fruits picked up from ground

same - in tea plantation

39/23

Thea

3

planted

2

24

Ligustrum orientale L.
weed in

2

25

Leucas
weed in

26

Vitis vericarpa
in thicket

2

27

Lygodium flexuosum
common

2

28

Acanth?
common weed~~29~~~~*Flemmingia?*~~
common in open woods~~between~~
in open woods

4

29

Flemmingia?
common

1

30

Disporum
rare

1

31

Rauwolfia
rare

1

~~32~~~~*Centasea?*~~
Dec. 8 - ridge top above
Huey Tard, mountains south west of Chiang
open evergreen oak
woods, burned frequently

1

33

Centasea
rare

4

34

Dendrobium?
epiphyticsmall tree 4 m. tall
(mostly trimmed down
to shrub size), petals white.
erect herb 1 m. tall.
flowers yellow.
herb ^{flowers} white.herbaceous vine
leaves flecked with white.
climbing on shrubs.

flowers blue.

erect herb, 1-2 m. tall,
flowers pinkish.
fruit black, pendent,
leaves glaucous.

fruit scarlet

1300-1400 m.

Dao ↓

erect to 1 m. tall, flowers purple.
flowers pale yellow

- 39134 *Eurya*
occasional
- 2 35 *Callicarpa*
rare
- 36 *Osbeckia*
common
- 2 37 grass
occasional
- 2 38 *Chunbergia alata* Sims
occasional
- 2 39 *Crassocephalum*
common
- 3 40 *Adenostemma*
rare
- 2 41 *Vitis*
rare
- 3 42 *Lithocarpus*
common
- 2 43 *Antrophyum?*
epiphytic
- 1 44 *Vittaria*
epiphytic
- 2 45 *Plectranthus or Coleus*
occasional
- 1 46 (orchid)
rare, ~~at~~ epiphytic
- 1 47 *Hedyotis*
rare
- 1 48 *Crotalaria*
rare
- 2 49 *Desmodium*
rare
- 2 50 *Desmodium*
occasional

small understory tree

fruit purple.

erect 1-2 m., petals
rose pink.

twiner; flower white.

heads nodding, reddish
to yellow.
flowers white.

vine, ϕ inflorescence
purplish red, fruit reddish.
large tree

fronds dried and curled.

fronds dried and curled,
pendent.
~~the~~ aromatic herb,
flowers white.

erect.

flowers yellow.

erect.

erect, 1 m. tall; flowers
purplish blue.

- 3915) *Eucalyptus*
occasional
1 52 *Amomum*
occasional
5 53 *Grewia*
rare
2 54 *Clerodendrum*
rare

Dec 8 Village near
Huey Tard

- 2 55 *Eupatorium*
occasional

Dec. 8 - near village
near Huey Tard.

- 1 56 *Costus*
1 57 *Commelina*
1 58 *Tagetes*
around abandoned cultivated
field
1 59

Dec 9 Village near
Huey Tard
Dec. 9 - Huey Tard

- 1 60 *Clerodendrum* frag. on
edges of
2 61 *Proche*
tree left in plantation

small understory tree;
fruit scarlet.
fruiting spike red.

shrub 1 m. tall,
fruit green.

erect shrub 1.5 m. tall;
bracts purple.

flowers white.

950 m

bracts red.

petals blue.
malodorous herb,
flowers orange.

flowers purple

950 m.

herbage frothy when broken,
calyxes maroon, corolla white.

Dec. 9 - Chiang Dao cave -
place where a stream
issues from base of
limestone mass - Poi
Chiang Dao (cave)

The mountain has not
been well botanized,
especially the top 1000'.
Very difficult to ascend.
Some curious grassy
areas high on the side
of the mountain - most
the result of lightning
fires. Otherwise wooded
except on cliffs and ridges.

Dec. 9 - Kang Dao Tao canyon
above the Raming
in moist deciduous forest
on canyon sides.

39162

Selaginella

3

on ~~rock~~ bare soil on east bank
above trail.

3

63

Menesia

occasional on steep slope

4

64

Dipterocarpus obtusifolius
common

Valley below is variously
cultivated. Bamboo thickets
and rice common. Landscape
appearing wooded, but
really largely cultivated.

a

Dec. 9 Mae Chaⁿ 23 km.
n. of Chiang Mai

Patch of mixed deciduous
forest on slightly sloping ground.
Trees spaced 5-10 m. about 25-30
m. tall, canopy perhaps 3/4 complete.
Trunks up to 5-6 dm. thick
above buttresses or swellings.
over 50% Tectona, some
Dipterocarpus tuberculata,
several other tree species.
Undergrowth mostly
herbaceous, some seedling
T. tonka. Leaf leaves falling,
some herbaceous vines.
for fire, dark gray.

500-800 m

1500-2500'

vegetative branches prostrate,
adherent to soil fruiting
branches erect.

culms - m. tall, upper

part paniculate.

tall trees, 25 m. tall. trunk clear,
6 dm. thick. material from ground
beneath tree flowers deep pink.

Dec. 9, The Raining mouth
of Chiang Dao
along stream in cultivated
land

39165 *Salix tetrasperma* Roxb.
single tree persisting

2 66 *Cyanotis*
in thick weedy growth

Dec. 9 - R. Me Ping (River),
above The Raining, below
Chiang Dao

4 67 *Salix tetrasperma* Roxb.
scattered tree along river

3 68 *Salix tetrasperma* Roxb.
scattered trees along river

2 69 *Polygonum*
edges of river

1 70 *Thelypteris*
river bank

Dec. 9 - Chiang Dao Cave
base of Doi Chiang Dao

2 71 *Ipomoea*
parasitic on citrus in village

1 72 *Aleurites moluccana* Willd.
planted in temple ground

2 73 *Spinola polyrrhiza* (L.) Schleid
floating in pond

385 m.
450

tree 12 m. tall, diffusely
branched.

elongate juicy vine,
flowers branched
erect; flowers purple,
3 petals equal.

385 m.
450

small shrubby tree

small shrubby tree

prostrate to broad flowering
branches erect.

fronds elongate, whip-like,
rooting near tips.
producing small plants.

460 m.
4500

flowers never yellow with
purple stripes on tube.
small tree.

Dec. 9 - Mae Chan, 23 km
n. of Chiang Mai
in mixed deciduous forest.

39174

Lindsaea

3

at base of ...

2

75

Dipterocarpus obtusifolius
occasional

1

76

Antiderma
in undergrowth330 m.
+100'

Dec. 10 - Chiang Mai airport
Sorghum
weedy places near muddy pond

300 m.
+1000'

Dec. 10 - Air Trip, Chiang Mai
to Bangkok (left side of plane).
Rice fields below Chiang Mai
are all dry, brown, and harvested.
Leaves green. Ditch banks mostly
lined with trees and bushes.

River lined with strips
of village, green with bamboo
and trees - mangos, palms (areca,
Cocos) - and bananas.

Villages form patches and
irregular strips of green.

Soil appears almost
white where dry and bare.

Foothills to east are thinly
wooded - crowns mostly not
or scarcely touching. Bare
ground showing on south
slopes. Forest gets thicker
as mountains are higher.

sprouts from cut
stumps, showing stipules.
shrub, ripe fruit
dark red, acid.

erect, ring of hairs at nodes
~~at~~ perpendicular to stem.

Many trees yellow, many
Melanorrhoea trees flowering,
showing up white or pink.
in first main range.
River plain narrow, in
rice. Second range similar
to first but somewhat higher.
Much Melanorrhoea, and
a considerable mixture of
tree species evident. Here
and in third range the
forest is dense, crowns
mostly touching, south slopes
especially steep ones, sparsely
wooded with gray ground
showing. Canopy generally
very irregular, not complete.
Much bamboo locally.
Foothills on other side
sparsely wooded.

On east side of mountain, an extensive mostly rolling plain, the flattest areas ~~mostly~~ in rice, most of it in sparse wood, some of it young regrowth after cutting. Most of this forest rather an olive green. Along river a strip of cultivated village land, many darranias, these a beautiful dark green. East of river a broad strip of rice culture. Then a broad area of scrubby thicket and trees. More rice around Lampang. Then town with many trees - *Barrus*, *Lamania*.

Rice fields with villages around air strip. Villages look like patches of bamboo and trees. Rice all harvested. Soil gray silt.

Southeast of Lampang desiccated paddy fields with termite mounds with trees. Then alternating with rolling areas of scrub, this sparse and with scattered trees.

Then a small range of hills with sparse forest with much bamboo, this

bamboo mostly dry. The whole aspect here much drier than around Chiang Mai. After hill a rolling plain, mostly forested, some scrub, some rice cultivation. The trees in the wooded areas mostly leafless or becoming so. Some sharply outlined patches of dry bamboo on small hills. Lower woods in ravines, etc. green. Some hills still green. Eastward the relief is greater and the forest though sparse is definitely green.

Then a high double range of hills, well wooded and green, but with considerable bamboo. The forest on the higher parts of this has a complete closed canopy, but this of somewhat irregular height. Steepest south slopes have sparse woods with ground showing.

Then another flat to rolling valley bottom with a little rice, mostly forest, this very green but appearing rather degraded

with evidence of shifting agriculture. Fair sized river meandering through this valley. Rough land to east very well wooded and mostly green, some trees losing leaves. South slopes tending to be brownish. Some clearings mostly overgrown. A few rice fields in flat places. Southward much more clearing, forest in more ragged condition.

Then high hills thickly wooded but mostly with much bamboo. Some valleys with excellent forests.

Along course considerable shifting cultivation but much less of it eastward. Cross valleys almost entirely in treeless condition much overgrown with weeds. Considerable population in these valleys.

The forest on the higher hills is thick, but tendency to brownness suggests that it is deciduous. Southward the hills begin to flatten out and the forest becomes much more sparse. As land becomes flatter the proportion of cleared land increases. A road cuts

across here, following near the south base of the range of hills.

Much rolling irregularly wooded land with some cultivation, fading into cultivated land and what appear to be several desiccating lake beds eastward. Southward fair areas of some sort of dry land cultivation, also areas of pasture.

The land along the course seems unsuitable for rice cultivation. Too irregular to irrigate. Cultivation becomes more prevalent, forested land scarcer and ~~more~~ forests sparser. A fair sized river to left, meandering.

Some filled or low lakes, some ~~are~~ still with water. Much cultivated land, considerable sugar cane. Then more and more rice. Down the valley trees become scarcer. Some rolling patches of sparse cultivation. Rice fields are getting ~~fewer & fewer~~ ~~more~~ ~~green~~ here. Many scattered trees. ~~many~~

Along river patches of village, a large bog with

a lake in center, Phragmites (?) around it, a sizeable bamboo forest.

The river is rather low with sloping banks cultivated during low water season, as at Cruzeiro do Sul, Brazil. (Prob. tobacco). This at Pissulok. Some lotus ponds here. Many coconut trees. Patches of ~~Saccharum spontaneum?~~ ~~reed~~ abundant along air strip. Some Imperata.

Below town ground is flat, mostly cultivated but looks dry. Small ponds, or bows, and parallel sloughs, mostly overgrown with floating vegetation. Irregularly scattered trees in cultivated and fallow land.

Some patches here are marshy, others seem a bit too high for cultivation at least of rice. Some small shallow lakes with patches of floating vegetation. Large banana patches. Considerable sugar cane near river.

The river is a ^{bordered by} strip of dark green ^{village} in the light olive green plain. Ox bows and old meanders

as well as marshy or inundated areas more prominent down river. Some rice cultivation around these marshes and some levees in the marshes. Villages scattered, connected in places by roads. Along these and along meandering channels villages tend to be continuous.

Down river trees tend to be absent from large areas of rice. Villages become scarcer. ~~Even~~ Even some channels have no trees.

Then very large areas of rice, with only small and widely scattered villages, trees very widely spaced, and numerous small circular or elongate ponds of all sizes, no outlets, ~~as~~ often surrounded by a narrow belt of grass. To eastward trees become more and more abundant.

Small tributaries of river meander almost like tidal channels. Very few roads in this area. Villages here almost treeless. General color brownish drab to green.

Again large marsh areas (east of river) and a

Cross
river
to east.

small isolated "island" hill of rock. A muddy lake near it with marsh and irregular patches of reeds(?) around it. Several other hills in distance.

Inundated land along tributary of river. Some apparently flat land with ~~some~~ scrub and patches of dry bamboo.

Then a mosaic of cultivated, weedy ground, patches of wood and bamboo, scattered trees in open land. A belt of wood east of this, then east a cluster of brownish hills. Under course another such hill, mostly with bamboo, some woods. A large area of woods east of this, rather scrubby but not much disturbed, including a few more small hills, dry on south slopes; much cultivated land in small clearing southward along course.

In distance a belt of clearing along a road.

Clusters of isolated small hills protruding up through alluvial plain become more numerous southward.

Eastward is large wooded area. west of it much cleared pasture, immediately along course considerable rice, alternating with brushy patches, dry land cultivation, etc. The fairly extensive patch of abrupt hills mentioned above is surrounded by cleared land mostly brushy or pasture, some cultivation. These hills are probably sandstone (or granite?), rather reddish. Skirting south of them is a large canal. West and south of the canal is rice land with numerous trees (or termite mounds), these becoming sparser rapidly westward, many small ponds. This is just below Chainat. The rice fields here become definitely green instead of drab. Some inundated land or a small lake with ~~some~~ 61 small elliptical floating gardens of *Ipomoea aquatica* (?) arranged in front of a small village. A considerable belt of very low land. West of it a strip of village with

some slightly higher ground with patches of sugar cane. The village more or less hidden by trees arranged roughly in a checkerboard pattern. The village strips mostly follow small canals or meandering channels.

Cross river again and follow it on west side.

Rice land here without trees. Many old ox bows east of river a large inundated area. Landscape ~~east of~~ on both sides of river marked by ~~the~~ meandering channels lined by village strips hidden by trees. Many irregular lakes or inundated areas surrounded by marsh and rice cultivation. Lopburi in distance. (Photos) More and more inundated land east of river. Rice here is partly green partly harvested and brown. Borassus locally abundant around villages. Crossed river to east. Broad areas of marshy land with abundant ponds

and channels on both side of river. Village strips are apparently on natural levees here, form a complex pattern just above Ayutthaya. Below it is mostly continuous bright green rice with small scattered villages completely flooded. Water showing almost everywhere except on natural levees of river. Villages seem small here and widely scattered in proportion to area in rice.

To east a vast gridiron of tree-lined canals and intervening rice fields. This partly yellow, mostly green. Rice along course bright green. Many Borassus, some truck gardens. ^{near villages and some on boundary levees between rice fields.}

More and more truck gardens as Bangkok is approached. Villages become more numerous nearer Bangkok.

39178

Dec. 11 - Bangkok

Hedyotis

weed in crevices of temple court

Dec. 12 - air trip Bangkok

to Saigon, north side of plane

East of Bangkok the country is covered by a vast gridiron of canals. The ground is mostly covered by water, divided into a rather regular rectangular pattern of rice fields. These in even stage turn from open water to green to brown harvested fields. It is hard to tell if the ditches are for draining or irrigation, but they serve for transportation. Their sides are almost continuous strips of village, marked by trees and bamboo. No roads at all. The gridiron is much finer, canals more numerous and closer together than on WAC chart. No trees here except along canals. Eastward more and more tidal channels between the canals.

39178a *Broussonetia papyrifera* (L.) Vent.
Dec. 6 Chieny Mar
paper made commercially from bark

erect, flowers white.

Eastward a higher proportion of the rice patches are brown and harvested less regular pattern. Villages along natural channels more than canals. Then a meandering river, ^{from Mekong to Gulf} trending about 60° back northwest from course. East of this the land is much drier and with scattered trees along course. See air truck farms for a short distance east of river, recognized by close rows of earth banked up in patches. Then and to north rice with few or no trees except along slighter entrenched meanders & tributaries of river. Irregular patches of slightly higher thinly wooded or brushy land. Rice land between these with scattered trees or termite patches. More and more wooded land, now densely wooded, some rather brushy. Rice cultivation

~~Dec. 11 - Bangkok~~

disappears. Forest becomes continuous. Trees broken by strips and dendritic patterns of savanna. Then some low parallel ridges trending n.w.-s.e.

The savanna then becomes less noticeable and the forest assumes a reddish color, from flowering trees or perhaps beginning to lose leaves. Occasional large pale green trees. Some level ground. Then a rather abrupt small range of mountains, thoroughly wooded except for grassy or brushy patches on south slopes and ridges.

Eastward a few very small hills and ridges, completely and densely wooded. Some small patches of decidedly reddish trees, general color dark green. Eastward becoming decidedly reddish & brownish green. Stream courses more densely wooded and mottled green. ~~stop~~

irregular strips of savanna between stream courses.

Some hilly country, the sharper peaks rocky and with only brush. It has become more numerous green with brownish patches between them on relatively flat ground.

Then a striking sharp curved range of limestone hills with bare white cliffs and peaks (photo). East of this roughly parallel low ridges trending n.w.-s.e.

Continuous dense forest. Then level ground, forested but with a dendritic drainage pattern of strips of light colored brush & savanna trending eastward. Probably passing border of Indo-China (Cambodia). Some grassy clearing below course. In distance

is north a large area of grass. The forest here tends to change to a mosaic of forest, scrub, woodland and savanna then more and more to savanna. Then a green

strips of bottom land smooth except with scattered trees, entrenched meanders of stream trending s. w. Then more scrub and savanna with trees in various proportions. Large grassland area to north then ~~some~~ a small rice area and a range of rough brown sparsely vegetated hills then ~~another~~ several irregular clusters of such hills. Forest in valleys ridges brown, rocky. Forest and savanna north of there. Then large area of rice land, with scattered trees a more likely - mounds. These more numerous, then Battambang and a meandering river, more rice land and a wooded stream bottom lands then forming an irregular network. A large dark area, probably forest, far to north. Drainage trending northeastward into a forest area with some small patches of grass. This changing to swamp

with low forest and emergent trees, conspicuous patches of light green grass some with ponds (to south of course cultivation and roads) especially in large green meadows north. West end of Tonle Sap, to north, swamp with many small patches of open water, then meandering channels leading to lake, forest south of lake completely inundated (photo). trees with crowns sticking out of water. Along edges of lake a yellow-brown "blow" as though straw were floating ~~the~~ and blowing to south side of lake. Lake is a rather muddy color but not really very muddy. North side of lake appears to be a very low wave-cut scarp. Back of this swamp and much open water. Perhaps the "scarp" is merely the abrupt edge of tall forest. Disappears eastward and north shore is inundated for a distance, to a lake (Pleam Bang). Lake becomes more muddy eastward, but with

a belt of clear dark water along north shore. The shore line ^{rather} east of Pean Bang is very sharply defined, even though back of it is swamp and flooded land.

Lake very muddy at east end. Land around Bhat Lan way inundated, village either floating or on piling. Large expanse of water below this, some floating grass trees with emerged crowns. A small village out in water, channels downstream marked by drying bare reddish mud flats. More inundated land, then dry land and cultivation south of sparsely vegetated mountain south of Chamrook village. This a large island surrounded by flooded land. East of this swamp with meandering tidal channels. Then light brownish green grassland ~~a small~~ with some ponds and green meandering

lowland along stream course - soil light tan or beige color, more and more cultivation, southeastern many small ponds. Small meandering very muddy stream, dark brown grassland (?), many muddy ponds. A mosaic of large areas of this, with scattered trees, and light greenish tan cultivated areas - Kasan low, and vicinity. Then dry cultivated land with bushy low land along stream course. Many fields outlined by hedgerows. Forest to north in distance. Some inundated land with swamp and savanna, patches of closely divided cultivated grounds outlined by hedgerows - then large areas of a different type of cultivation, elongate fields, swamp and flooded land back of a broad ~~to~~ natural levee cultivated and with a strip of village with trees, bordering the Ahe song. Large sand bars, completely bare. Cultivation on east bank - broad natural

photo

levee. Mekong stretches off to north. much braided (photo). To east a mosaic of swamps, open water ~~land~~ forest, and ~~buff~~ colored rice with levees. Large patch of uniform forest with geometrical boundaries. some areas in it cleared, dark green, probably replanted. Then large area of dark reddish brown marsh with muddy ponds and green gallery forest along meandering channels. Then more dry land in rice and wooded patches. These rather sparse and ragged. some patches of marsh, patches of shifting agriculture and of open rice culture forming a mosaic. Some roads. Then large area of uneven woods, probably mostly secondary thickets with small clearing or savanna patches, both dull brown and buff-brown. Brown overcriss-crossed by trails. This continuous for some distance, with varied

amounts of cleared land, varied amounts of wood with large trees, a meandering stream. East of this a greater proportion of clearing and savanna and grassland. Then rather better forest with strips of clearing. (Probably crossed Viet Nam border.) Then mostly savanna with some cultivation some patches of forest especially to north. Then Mountain south of Khe Dol, north of Tay Ninh, a big town. The mountain covered by sparse brush - south of this is grass and cultivation north of it wooded land.

Then a mosaic of varying cultivation, patches of forest plantation (what?) trees in rows, grass, rice, village, etc. north of meandering river Rach Cai Bad. Then mosaic of wet rice and dry areas of small fields and houses surrounded by hedge rows (photo). Rice

is green, higher, some
buff-drab with dark
green hedges. rows. Some
large dark marsh areas in
rice, many channels.
This mosaic for some
distance along north
of river. Large flooded
areas and rice fields
along river, considerable
~~marsh~~ ^{to} marsh-land,
less rice, eastward.
Rivier de Saigon in distance
to north. More and more
marsh and wet grassland
as Saigon is approached.
A large canal crossing river,
as on H.C. chart. Then
higher land, cultivated
in rice and in garden
patches, these surrounded
by tall hedge rows. Many
roads. This area intensively
utilized.

Approaching airport
areas of house with
hedge rows and many
small elaborate cemeteries
and striking temples, patches
of planted woods.

Phimosa rudica very
abundant along air strip.

Dec. 12 - air trip from Saigon
to Clark Field, Philippines.
Intensively cultivated
land, largely sugarcane,
on both side of Rivier de
Saigon. Channels and
ditches lined with trees.
Away from river land
is higher, cultivated, very
pale soil, patches of forest
and scrub. Small streams.
Some eroded land with
sparse scrub. Rolling
land west of lower Long Be
river (?) largely in scrub
and scrub forest. Some
cultivation, especially rice,
in low spots. East of river
alternating areas of
rice and dry land cultivation.
Then an area of scrub
or scrub forest with scattered
emergent trees, then denser
forest, then more scrub.
A town along railroad. North
of railroad a mosaic of
forest, savanna and some
cultivation, forest predominating.
Savanna and cultivation
in broad strips with very
irregular margins, the
most prominent of these
following Long Nai River.
Then solidly but poorly

wooded country, ~~scarcely~~ cut off by clouds. A few glimpses of forest through holes in clouds. A patch of reddish grassy or cultivated land with a town, then a mosaic of forest, savanna, and dry cultivation - soil red. To north mostly forest. Closer to course numerous small clearings and a large even planted forest, then dense natural forest with a small river, not very muddy, some small roads. Then patches of shifting cultivation in various stages of revegetation. Only small bits of forest with large trees. Some irregular patches of grassland. A meandering river with very rocky bed, uneven degraded forest. Then large savanna with gallery forest along meandering streams. Next to south of it along course. Savanna extends to east, some ponds in it, a closely meandering stream with no gallery forest. Two circular ponds

and marshy spots. Some patches of forest. A range of hills and much forest to north of savanna eastward. Savanna more and more irregularly covered with trees, merging into forest ~~then~~ in hilly country. Then much bright green savanna in hilly areas. Some small streams, their courses locally rocky. The savanna merges with what appears to be sparse and irregular scrub ^{with dense scrub forest} some very dry cleared patches. Range of ~~the~~ more prominent hills directly on course well forested, scrub on lower hills north of these. Clouds obscure visibility. Hills covered by rather sparse and irregular scrub forest, cleared along streams. Forest sparser eastward. Some bright green grass ^{in patches} to northward on hills mixed with forest. Eastward forest is sparser and more irregular, reddish ground showing on low

ridges, clearing only
near stream courses.
Changes to savanna
clouds obscure visibility.
Irregular mosaic of
savanna with some
forest and woodland,
some spots badly eroded,
cattle trails or very narrow
roads here and there. Terrain
becomes more hilly and the
wood more dense, though
still generally sparse
enough so the rocks and
ground show through
in many places. Some
patches of savanna on
high ridges and slopes,
hills higher now, slopes
mostly wooded. Scattered
clearings and former ~~clearings~~.

Then badly eroded low
rolling country, mostly
irregularly sparsely wooded.
Then more irregularly wooded
hills, with woodland,
dense scrub-forest, and patches
of savanna. More lower
hilly eroded country
with irregular woodland,
ravine wooded, hills
savanna or woodland,
changing eastward to
savanna with gallery

forest along stream courses.

Then green flat rice
land pinpering into
hilly country from
broad flat land, this
somewhat to north.

Along course sparse scrub
in woodland on alluvial
fans at base of poorly
wooded rocky hills on
course. To north green,
near ridge, then red

cultivated land with
areas of red sand dunes.

Then broad sand flats
with little vegetation
along shore of China Sea.
Local estuary seaward
of green ~~land~~ ~~island~~ a
little north of where coast
turns irregularly eastward
along course. Large mountain

more just back of
narrow ^{strait} to ^{east} of plain,
where coast turns north,
again. Ridge grassy, ravine
wooded. Coast to north
very irregular. Beaches
tan, ^{coln.} some bright orange
red ~~eroded~~ eroded a sandy
areas on very irregular
peninsula, far to north.

island

Then open sea.

Dec. 14 - Das Marinas Cavite

Air deposited tuff - native. friable, coarse to fine grained hard fragments to 1 cm. - more covered by a thin soil. dark gray very sticky clay, during dry season extremely hard and tough, cracking into blocks not more than 1-2 dm. across.

Used for rice only. Workable only in wet season. This tuff called "adobe stone" in higher land ~~and~~ is subaerially deposited, in lower areas water-laid, here much harder. Tertiary in age, supposedly from Taal Volcano.

Dec. 14 ^{near} Tagaytay

Greenish tuff deposited in successive eruptions, with thin buried soil layers, also round nodules in these layers. Overlain by a profile about 1 m. deep, the top half a black blocky clay, hard and tough but not unworkable. Below this a dark reddish brown gradually changing to unweathered tuff. Boundaries not at all sharp between layers.

Silang

Dec. 14 - Taal Volcano -

a large caldera with outer slopes very gently sloping. inner slopes sharply eroded in very steep fashion.

The ash and tuff on outer slopes regarded as tertiary.

Dec. 14 - Between Tagaytay and Manila the soil is all derived from the ejecta "adobe stone" from ancient Taal Volcano.

For about 30 km. from Manila the ash and lapillal were laid down in water and are consolidated and impervious. The soil is shallow, is waterlogged the greater part of the year, very desiccated the other part. It is suitable for wet rice cultivation but scarcely supports - see. The landscape is open, with bamboo and some trees around villages, also where there is rough ground. From 3 km. on the general land surface

rises gently, with a rolling topography, is the caldera rim. In this part the pyroclastic material and ash were deposited ~~and~~ subaerially. The consolidation is not so complete and the ~~the~~ material not so impervious. The general profile is that of the black soil described on bottom part of p. 94. Where this has not been seriously eroded the surface soil, where worked, is black. Where eroded it is not red-brown, lighter where badly eroded.

Dec. 14 - Hilang, south of Manila, Cavite Province.
Psychotria
 in secondary thickets

39179

1

The area ~~of the~~ watershed truly may well never have been forested though this is impossible to determine now. The higher ground was doubtless well wooded but nothing remains of this now. The landscape is now a man-made one. Sugar, rice, and perhaps some other field crops are common. Large areas are in coconut plantations. Mango, *Chrysophyllum*, *Greca*, *Landorium*, *Psidium guajava*, *Innونا* spp., citrus, are generally abundant with no obvious regular arrangement, especially around houses. Papayas are scattered as well as in small plantations. Papayas and pineapples are in places planted together. Coffee plantations are shaded by *gumudis*.

shrub, fruit orange, fleshy, possibly slightly immature.

Dec. 15 - Clark Field, Luzon

39120

Ficus

street tree

3

81

Polyscias

common ornamental shrub

1

82

Trema

occasional on golf course

3

83

Ficus

occasional on golf course

1

84

Artocarpus

occasional on golf course

Dec. 16 - Soer Island, Guam

3

85

Lepturus repens

common in open ~~rocky~~ gravelly area,
washed over by salt water
during typhoon

Dec. 17 - Agaña, Guam

3

86

Ficus pumila L.

creeping on old Spanish bridge

small tree, dissected
leaves from sprouts
from cut stub, figs
immature.

sterile shrub 1 m. tall.

tree 15 m. tall, trunk
20 cm dbh; leaves green
beneath, fruits blackish.
small tree, lactiferous.

tree 20 m. tall, sterile.

2 m

tufts sending out runners.

4 m

creeper, ~~a~~ younger branches
tightly adherent to stone.
those with large leaves
erect: no fruit seen.

Dec. 16 - Coors Island -
Effects of typhoon
of Nov. 11

Coast guard personnel
wind came first from
N.E. then S.E.

Waves came over west tip
of island from sea side
and even well eastward
up to top of high ground.
Here are deposits of fresh
coral material up in
the *Scaevola* which is
badly battered but
not dead along top of
beach. Material carried
up is coarse up to boulders
2-5 dm. across.

Casuarina ^{leaves} dead on
seaward slope, browned
on seaward side of trunks
on high ground.

Seaward part of reef
platform swept clean.

Waves from lagoon deposited
much sand and some
cobble and boulders in
grounds of coast guard
station. Lawn of *garden*
listed where covered by
any amount of sea water.

Portulaca oleracea and
Cyperus rotundus showing
fast recovery.

Trunks of even the deadest
looking *Casuarina* are
sending out tiny green
sprouts. Branches dead
or apparently so.

Along inner beach on
large crescent there
seems to have been
deposition toward the
horns, and removal
of at least 1 dm. or so
in the deep part of the
concavity, exposing
the upper parts of the
root systems of *Casuarina*
trees and other shrubs.

Along the beach east
of this there seems to
have been excavation
in the concavities and
deposition back of the
cusps.

In the interior from
the inner beach
there is a great tangle
of branches, trunks
and rubbish. None
of the plants seems to
have suffered very
much except *Casuarina*
which is very brown
in most places. In
some places *Scaevola*
and *Turnefortia* are badly

battered and almost leafless. Only where plants are actually uprooted are they completely killed.

In the place where the 1949 typhoon scoured across the isthmus this one said by the coast guard men to have cut in much farther. This appears to have been from the lagoon side, but not really very much, as the rocks in the inner bare part are still blackened by algae. Perhaps material may have been removed from the ~~lagoon~~ ^{lagoon} 100 m. or so. Reyes confirms this.

Plants observed:

Casuarina equisetifolia
Scaevola sericea
Tournefortia argentea
Cordia subcordata
Clerodendrum inerme
Thuarea involuta
Euphorbia chamissonis
Euphorbia hirta
Cenchrus echinatus
Lepturus repens

Ipomoea per-caprae
Chesperia populnea
Portulaca oleracea
Hypericum rotundifolium
Cynodon dactylon
Pennisetum aciculare (only on exposed rough limestone).

The *Cynodon* lawn is pretty well killed out in low spots where salt water stood & green on higher ground except where swept by waves from seaward. But even in low places are green patches. Possibly none of the grass is really killed.

Where the roots of *Casuarina*, *Scaevola*, *Tournefortia*, etc. are partly exposed the plant is generally in bad shape. But none of the plants listed seemed really killed except when uprooted.

Dec. 16 - Coast from
Marajan around to
Merigo - Trees show
much browning, much
breaking of branches
and some of trunks, a
few trees uprooted. -
general not as much
defoliation as ~~at~~ 3
months after typhoon. Few
places show any
washing away of
soil or conspicuous
effects of flooding by sea
water. Perhaps more
debris washed & blown
into thickets than in 1950.
Mangroves at Merigo
scarcely affected. Nipa
at Marajan and elsewhere
browned somewhat but
not broken. Leucaena
bedraggled looking
but not killed. Artocarpus
with leaves mostly
browned where hit by
spray, but recovering.

Dec. 17 - Kotod, in Naval
Magazine Area.

Grassy slopes, some areas
with *Miscanthus*, ~~and~~
mostly without *Miscanthus*
but with *Paspalum*, *Fimbristylis*,
Chrysopogon, *Stachytarpheta*,
Hyptis capitata, *Eleusine*,
and other weedy herbs,
abundant thickets of
Cestrum, *Triphasia*, *Psidium*,
Clodion, *Hibiscus tiliaceus*,
Pandanus. Scattered
trees of *Pimenta*. Some
coconuts and mangos,
bamboos, *Casuarina*, etc.

Soil on slope is odd - a
stiff black clay about
~~15-20~~ 15-20 cm. or more thick,
blocky when drying, over
a yellow-brown or yellow
other clay, also stiff
and plastic, but crummy
when drying. The surface
black layer is crummy
~~when wet~~ on the
surface when very dry.

This area belonged to
the Agricultural Experiment
Station before the war. Cattle
were grazed here. Experimental
grass plots nearby.

Dec. 17 - Kotod, ^{heads of Malmong R.}
 of cross road, ^{scattered} ~~east of~~ ^{south of} ~~the~~ ^{the} ~~road~~ ^{road}
 secondary thicket
 and weedy slopes, disturbed
 area

39187 *Tarenna sambucina*
 occasional

2 88 *Pimenta ~~racemosa~~ racemosa*
 common, scattered trees,
~~was~~ said to have been
 introduced before the war.

2 89 *Glochidion*
 occasional

90 *Glochidion marianum*
 common

4 91 *Scleria*
 locally abundant,
 gregarious.

3 92 (*Laportea*)
 local under mango trees.

4 93 *Scleria*
 on bare soil

1 94 *Hedyotis biflora* (L.) Lam.
~~very~~ local, on bare soil

2 95 *Phyllanthus simplex* ~~variegatus~~
 occasional

2 96 *Hyptis capitata*
 abundant

3 97 *Fimbristylis annuus*
 common

100 m. shrub ^{2.5} m. tall; fruit
 immature.

✓ small tree, 4 m tall,
 strongly aromatic when
 broken; sterile.

shrub 1.5 m. tall, ^{leaves} ^{glaucous}
 flowers yellow. ^{when young}

shrub 2 m tall, leaves
 glaucous beneath when
 young; flowers yellow.
 erect, 1 m. tall.

prostrate, flowers purple.

flowers lavender.

sp. ending branches

erect, prostrate, flowers
 white. "butones" cut stubs
 said to cause seriously
 poisoned wounds, sometimes
 fatal.

39198

(a. m.)

2

common on bare soil

2 99 (grass)

occasional

200 (algae)

parasitic on *Alocasia*

Plants seen in bushy pasture, Kotod.

*Urena lobata**Stachytarpheta indica**Desmodium triflorum**Cestrum diurnum**Sida acuta**Merremia hederacea**Ageratum conyzoides**Morinda citrifolia**Psidium guajava**Triphasia trifolia**Pimenta acris**Glochidion marianum**Nephrolepis hirsutula**Hyptis capitata**Paspalum orbiculare**Paspalum dilatatum**Paspalum conjugatum**Chrysopogon aciculatus**Heliotropium ovalifolium**Centella asiatica**Cassia sophora**Emilia javanica**Cananga odorata**Elephantopus mollis**Fimbristylis annua**Hibiscus tiliaceus*

50 m

spreading

Scleria sp.*Scalvola sericea**Pandanus tectorius**Tarenna sambucina**Phyllanthus amarus**Cassytha filiformis**Scleria* sp.*Bambusa vulgaris**Mangifera indica**Curcuma domestica**Vernonia cinerea*

legume

*Chloris radiata**Casuarina equisetifolia**Pseudolephantopus spicatus**Corchorus acutangulus**Dimeria chloridiformis**Mitracarpum**Hedyotis biflora**Malvastrum coromandelianum**Flagellaria indica**Polypodium scolopendria**Pyrrosia**Davallia solida* } on mango*Ipomoea pes-caprae**Hyptis suaveolens**Zingiber zerumbet**Fimbristylis dichotoma**F. miliacea**Phyllanthus simplex**Waltheria indica*

Dec. 18 - south boundary
of Anderson 27B.

bearing of boundary 70° w. of n.

Forest on fore slope at top
of cliff - low, scrubby,
at most 10 m. tall,

trees to 2 dm dbh. mostly
Macaranga. Ficus

Ochrocarpus. Guettarda.

Heritiera longipetiolata

Understory of Cycas, guamia

Aglaia. Xora triantha,

Psychotria marianae

Triphasia Moinda citrifolia, Cynometra

such vines as Moinda umbellata

epiphytes - Polypodium ^{punctatum} ~~longipetiolata~~
Pyrosia, Davallia

on rocks Asplenium ^{calceatum} ~~calceatum~~

Monument at edge of
Anderson 27B on top ridge
of rampart. Measured
500 ft. inland 70° w. of n.
from monument.

Here is dense tangled
thicket of Ochrocarpus.
Aglaia, Ochrosia, Macaranga
Cynometra, Guamia,
Moinda, Pipturus,
Pandanus toloru, some
Ficus. Cycas, much Piper

in undergrowth. This
thicket is dense but
very irregular, occasional
rather dead larger
trees sticking out the
top as emergents.

The land of Anderson
27B up to the boundary
of the private land
to the south has been
bulldozed clean of
vegetation, soil and
all.

Dec. 18 - north end
of Anas ~~Conservation~~
~~Reserve~~, just south of
Anderson in forest
in scrubby forest on
thin soil on limestone

- 39201 *Stenotaphrum micranthum* 160 m. prostrate
5 common in small semi-
open spots
10 02 *Heritiera longipetiolata* Karst. 170 m. tree 15 m. tall, 3 dm. dbh,
very local on slope strongly buttressed;
above top of cliff. flowers greenish.
03 *Maytenus* semiscandent shrub
occasional in forest flowers white 4-5 parted;
fruit immature

Dec. 19 - ~~Dugway~~ Y-Pigo Conservation
~~Reserve~~, n.w. of Yigo
in wet forest, mainly Pandanus,
on limestone.

- 5 04 *Asplenium caudatum*
epiphytic on small sapling
1 05 *Asplenium*
epiphytic on tree trunk.
1 06 *Antrophyum reticulatum*
epiphytic on tree trunk
4 07 *Ophioglossum pendulum*
rare, epiphytic on tree trunk
4 08 *Trichomanes*
seen on one tree trunk
5 09 ~~Sp.~~ (bryophyte)
epiphytic on *Cugenia reinwardtiana*

160 m. prostrate

170 m. tree 15 m. tall, 3 dm. dbh,
strongly buttressed;
↓ flowers greenish.
semiscandent shrub
flowers white 4-5 parted;
fruit immature

160 m.

↓

fronds curled from dryness
when collected.

fronds limp and wilted
from dryness when
collected.

fronds thin, not very firm,
hanging vertically, roots
forming large mass.
forming a mat, fronds
curled from dryness.

Dec. 19. ^{Y-Ping} ~~Longday~~ ^{incubation} ~~see~~
 Yis.

Thick degraded forest
 trees mostly 5-10 cm. dbh
 about 6 m. tall spaced
 2-5 m. apart, mostly

Pandanus tectorius

Premna obtusifolia

Aglaia

Ochrosia oppositifolia

Hibiscus tiliaceus

Maytenus

Guernia

n. *Pongium* ~~clad~~

ground cover sparse,
 mainly small *Nepenthes*
brenaniana

Epiphytic ferns - *Belvisia*

Davallia solida *Polypodium*

~~*Polypodium*~~, *Asplenium*

nidus, *Vittaria*, *Pyrosia*,

common. Epiphytic hepatics

abundant on trunks +

branches, epiphyllous at

least on *Triphasia* ^{maytenus} leaves.

Some epiphytic orchids.

Treymanetia common climbing

on trees.

Shrub layer of *Piper*, *Discorealys*.

seedlings of *Maytenus*

at 47

collected from pp. 12-13

160 m.

39210

2

epiphytic on *Tupharia trifaria*

2 11

epiphytic on *Funaria*

5 12

epiphytic on ~~the~~ stilt roots
of *Landanum tectorius*

2 13

epiphytic on trunk of small tree

2 14

epiphytic on small branch

3 15

epiphyllous on *Morinda umbellata*

3 16

epiphyllous on *Flagellaria*

3 17

epiphyllous on *Aglais*

3 18

epiphyllous on *Freyxinetia*

19

epiphyllous on *Discochloa*

4 20

epiphytic on *Funaria*

2 21

epiphyllous on *Asplenium nidus*

2 22

epiphyllous on *Davallia solida*

23

2 24

epiphyllous on *Polypodium scolopendria*

2 25

epiphyllous on *Polypodium* sp.

2 26

epiphyllous on *Piper guianense*

thin, not forming cushions.

- 2 epiphyllous on *Nephrolepis*
 2 27 epiphyllous on *Maytenus*
 2 28 epiphyllous on *Ochromia* & *positifolia*
 2 29 epiphyllous on *Turphasia*
 1 30 ~~*Stemodia* subd.~~
 epiphytic on *Antocarpus*
 3 31 *Thuidium*
 on coral limestone rubble

Dec. 20 - Anao - Mt. Inawatia
 Reserve -

Edge of cliff - Wind-
 sheared low bush, locally
 at least over 50% *Turphasia*,
 but with *Maytenus*, *Canthium*,
Psychotria mariana, *Ficus prolixa*, *T. tinctoria*,
Allophylus, *Ochrocarpos*, *Cycas*, *Premna*,
Jasminum, *Guamnia*.

Bare rough limestone at
 top of cliff has *Clusia*,
Andropogon (with green an-
 res), *Vitellaria carmoensis*,
Eragrostis ciliaris, *Elephantopus*,
repens, *Wedelia biflora*
 var. *canescens*, *Hedyotis fruticosa*
 var. *marianensis*, *Achyrocline*,
 etc. *Phyllanthus marianus*

In the scrub *Polypodium scolopendria*,
Papernia, *Procris*, *Clethrum*,
Epiphyllum has lichens, *Taeniophyllum*

leaves not strictly
 distichous, more or
 less irregularly arranged.

Looking down on vegetation
 on terraces below there
 is very little evidence
 of typhoon damage.

Transect 2, appr. north
 just inside boundary,
 100' through a very scrubby
 thicket-like forest with
 few trees above 8 m. tall and
 1 dm. thick, some scattered
 large ones emergent
 but these have suffered
 much from typhoon.
 Most abundant small
 trees are *Leptospermum*,
Ochromia, *Albizia*, *Cycas*.
 Larger trees seen are
Guettarda, *Premna*,
Ficus prolixa, *Pouteria*,
Pandanus tectorius, *Ochromia*

Epiphytes very few
 Pyrrosia, Polypodium sp. ? Davallia
 Polypodium ~~gymnophyllum~~ ^{gymnophyllum} ~~gymnophyllum~~
 but not abundant, ^{more on} ~~fallen logs~~
 shrubs not recorded in
 transect but present -
 Maytenus, Hirsutus ~~terrestris~~
 Baccaria, Triphasia, Piper,
 Macaranga (rare)
 Vines - Alyxia, Jasminum,
 Morinda umbellata,

Cycas shows effects of
 drought & of typhoon &
 Old leaves tend to abscise,
 on many plants have
 all been shed. New primordia
 are growing upright a dm or
 so high. Cut trunks tend to send
 up several branches.

Seedlings of Aglaia, Cycas,
 Ochrocarpos, Guainia,
 Morinda citrifolia, Triphasia,
 Jasminum common
 Pandanus, Triphasia, Cynometra
 Ochrosia less common.

Small clearing on trail
 just inside boundary
 has Sporobolus elongatus
 Stachytarpheta indica
 Lepturus repens common
 One plant of Bidens, ^{two} ~~one~~
 Cestrum, several Lencane. Transect
 #7 runs north from this clearing.

at top of cliff just south
 of top of trail made Transect
 3, in low ~~low~~ forest about
 4-5 m. tall closed, mixed,
 Triphasia most abundant.
 slope gentle, steeper
 toward top, average 8° slope,
 rough limestone with
 very little soil. No
 obvious signs of typhoon
 damage here.

Back from the ridge of
 which the above is the fore side
 is a depression in which
 the forest is much more
 luxuriant than on the
 flat limestone farther
 inland. This broad
 trough is apparently run
 parallel to the cliff, but
 there is no indication
 whether or not it runs
 the whole length of the
 reserve.

(on Dec. 26 this clearing had been
 lightly burned, the fire
 running somewhat into the
 woods, affecting the near
 end of the transect.)

Dec. 20 - Anao ^{Muti} Conservation
Reserve

- 39232 ~~in scrubby~~ in scrubby forest
4 *Cyperus hyllingia*?
local in trail
4 33 *Ficus prolixa*?
just back from top of cliff
6 34 *Psychotria ~~malayana~~ Merr.*
rare
1 35 *Flouya ruderalis*
on ~~the~~ pitted limestone
at cliff edge in full sun
2 36 *Erugrostis ciliaris*
on pitted limestone at
cliff edge in full sun
4 37 *Canthium odoratum* var. *timianense*
~~in~~ in scrub on edge of
limestone cliff
2 38 *Usnea*
on stems of *Triphasia*
on exposed cliff edge

Dec. 21 - Apra Heights Cross
Island Road

Patch of *Lasianthus* up
to 8-10 m. tall, 15 cm. dbh.
growing in area of *Dimeris*
on gentle slope. *Leucaena*
out the *Limnium* but
under it are ~~best~~
flourishing *Cerbera*, *Leucaena*,
Myrtella, *Wikstroemia*,

160 m.
↓

heads white

Banyan type tree,
low, widely spreading,
fruit immature (very
large for *F. prolixa*)
shrub 1.5 m. tall, fruit
immature.
stems and inflorescences
fleshy, green to red.

Melastoma, *Morinda*
Timonius, *Geniostoma*
Decaspermum, *Phyllanthus*
saffordii, *Pandanus tectorius*, some herbs.
The blanket of needles
may have an adverse
effect on the *Dimeris* as
well as the shade. 1 m.
spaced about 2 m. or
more but smaller where
crowded.

Dec. 22 - Cotal Conservation Reserve, Cross Island Res.

Mosaic of *Dimeria* and *Miscanthus* types, with much *Casuarina* of all sizes up to 5-6 m. a more on flat high ground.

In *Dimeria* area are patches and spots of bare ground or very sparse vegetation. These are washed out and wind scoured strips.

In many places are well developed erosion scar assemblages of plants. In some spots *Chrysopogon rhizome* have been buried by deposited soil to several cm. Their shoots are appearing in profusion at the surface.

Miscanthus seems to be invading the *Dimeria* here, but this should be checked very carefully. Transects 4 & 5 are on flat ground with a good diversity of vegetation.

In eroded places are exposed curious mycorrhizae - apparently on *Casuarina* roots (but perhaps on *Myrtella*). These should be investigated. Collection made.

Dec. 22 - Cotal Conservation Reserve

Flat top of mesita, not an original surface, perhaps, at least at somewhat lower elevation than nearby se.

Mosaic of *Dimeria* and *Miscanthus* grasslands. *Casuarina* seedlings locally abundant in *Dimeria* type. Many areas have been eroded and are dominated either by *Stachytarpheta* or *Hydrocotyle*.

Erosion and deposition cycle tends to maintain the flat surface of these mesitas, as the clay is deposited in the depressions. Possibly there could be considerable degradation without destroying the flat character of the surface. The occurrence of slightly raised ground toward the edges is puzzling. This is evident only in some spots. Well grown *Casuarina* trees are more common along the edges of the mesitas than generally.

39239

Dec. 21 - south of Yona
Paspalum bimbriatum
 roadside

1 am.

Dec. 21, Back of Ylig in
 Cross Island Road

1 40

Lophium
 abundant along road

Dec. 21 - Cross Island Road
 just east of Ufa Heights

41

Machaeus meyeri
 in Casuarina savanna

Dec. 22 - Mt. Tenjo - Top is
 densely overgrown with
Miscanthus with
 scattered *Leucaena*.
 West side, at end of road
 is very densely covered
 by *Leucaena*. East
 shoulder with more
 less flat top is largely
 covered by *Imperata* with
 sparse *Casuarina*, considerable
 erosion from scars started
 by military activity.

Steep slopes densely covered
 by *Miscanthus*

East slope main top with
 one or two *Casuarina* trees and
 dense growth of *Leucaena*

70 m.

90 m.

from thick rhizomes

100 m.

dense patches

Dec. 22 - Ritidian Point
 Looking down from
 top of cliff reveals very
 little obvious typhoon
 damage, though Mr.
 Limning says the breadfruit
 trees in the coconut plantation
 have suffered severe
 damage.

Pluchea odorata is
 still persistent around
 lighthouse area, though
 not common. Also seen
 a half km. or more
 down the road from
 the point.

Variation in *Ficus prolixa*
 is not at all simple.
 Some have very large
 speckled fruit, others small,
 not speckled these have slender twigs.

39242

Dec. 22 - Mt. Tenjo
Musaanthus caribaeus
 Dominant on steep slopes

Dec. 22 - Nimitz Hill,
 top of ~~Spunance~~ ^{Spunance} & not

93 *Crotalaria retusa* L.
 common in roadside ditch

Dec. 22 - Total observation
 area, cross island road
 in Dimeria grassland
 on flat top of mesa on
 red clay soil

44 *Euphorbia*

rare

5 45 *Ipomoea littoralis* B.
 common locally

Dec. 22 - Ritidian Point
 in scrub at top of cliff

46 *Ficus prolixa* var.

47 *Ingénia bryanii*

48 *Ficus prolixa* var.

49 *Ficus prolixa* var.

50 fern

Dec. 23 - Agaña Swamp

51 ~~Phaseolus~~ *Phaseolus*
 roadside edge of swamp

280 m.

vine 1 m tall, this the
 only fruiting culm seen.

150 m.

~~shrub~~ herb up to
 0.8 m. tall flowers yellow.

150 m.

erect, gland appendage
 white.

prostrate creepers,
 flowers purple. stigma
 white, bicapitate.

170 m.

shrub 3 m. tall, lactiferous,
 figs almost ripe, purplish
 white to green, speckled with white
 shrub 1 m. tall, sterile.

(type locality)
 small tree, more or less
 weeping habit, figs immature.
 small tree, figs immature.

2 m.

vine, flowers purplish

Dec. 23 - north end of Harmon
Field

- 3927 *Melochia*
3 common in secondary scrub
on limestone

Dec. 23 - northwest corner
of Y-Piga on water reserve
dense tangled moist forest

- 4 53 *Ficus prolixa*? T.
occasional
- 2 54 *Adiantum*
epiphytic on banyan
- 2 55 moss
epiphytic on banyan
- 3 56 *Vittaria*
common on tree trunks
- 2 57 *Asplenium caudatum*
occasional epiphytic on tree trunks
- 4 58 *Asplenium laseritilobum*
rare on tree trunks
- 4 59 *Belvisia mucronata*
very common on tree trunks

Dec. 24 south side of Piga
Conservation reserve
thick moist forest

- 4 60 *Adiantum*
common, epiphytic
- 2 61 moss
on tree trunks

85 m.

shrub 2 m. tall. leaves
greenish, flowers
deep pink in center,
whitish distally.

163 m.



banyan type tree (fallen
but still alive), fruits
on twigs and in clusters
on main stems.

pendent

pendent

162 m.



leaves fleshy, not clearly
distinct; flowers greenish white

Dec. 24 - back of Agaña forest
 a - demonstration garden, 1-2 m.
 n. of Yigo

Thick forest on thin rocky soil
 39 762 (orchid)
 " occasional, epiphytic

1 63 orchid

rare, epiphytic

- 64 *Isotriaena* sp. 1-2 m.
 occasional

(100 m)

f.

leaves fleshy, not
 strictly horticulous, flowers
 greenish.

tree-like shrub 3 m. tall;
 flower buds greenish white.

Dec 20 - road to Igouville
 demonstration Farm Igou
 trees in wet forest on
 very thin soil on ~~rough~~
 rough limestone

Ochromia oppositifolia

Samanea obtusifolia

Ficus prolixa

Claoxylon marianense

Agave marianensis

Pandanus tectorius

Morinda citrifolia

Guamnia marianensis

Artocarpus marianensis

Hibiscus tiliaceus

Triphasia trifolia

Melastoma multiflorum

Quettarda speciosa

Antea beyana

Cananga odorata

Leuca trantha

Maytenus Thompsonii

Pandanus dubius

Elaeocarpus poga

Dec. 25 - Top of cliffs just
north of Ichas St. - cliffs
are of very rough
limestone (not quite
vertical) densely wooded.

At top are *Triphasia*,
Premna, *Laportea*, *Agave*,
Pandanus tectorius, *Guettarda*,
Morinda citrifolia, *Eugenia*
sinuatifolia (only small
ones seen), *Cycas*, *Guamra*,
Melanolepis, *Claoxylon*,
Ficus prolixa (dead or fallen
- only seen), *Pipturus*
seedling, *Inga triantha*,
Carica (in opening). Below,
perhaps 25 m. down is a
large *Artocarpus* *marianensis*
with entire leaves. *Ficus*
common down a bit.

In rough limestone
cliff *Isperium baccatum*
is very common, also
Tectaria crenata. *Epiphyta*,
Pyrosia, *Davallia*, *Polypodium*
linguiforme, *Dendrobium* (?)
are common but not
abundant. Mosses
and hepatics common on
trees and rocks, but not
in profusion. *Balanophora*
on ledges, on roots of
Premna (or perhaps *Triphasia*)

In the flat at top of
cliff is old cleared land
now a savanna of
Pennisetum setosum and
small *Pipturus*, ^{*P. marianensis*} and *Triphasia*,
with thickets of *Triphasia*
with some *Pandanus tectorius*,
~~and~~ *Blackia*, *Schrosia*,
Gerodendron *inermis*, etc.
Back of this is an abandoned
coconut plantation.

Dec. 25 - Ritidian Point, top
of cliff.

Looking down with
binoculars it is not
possible to see much
effect from typhoon. Only
two trees broken or blown
down on lowest terrace.
Some bare branches
possibly from this typhoon
on other. Our clear terrace
visible, and its plateau.
East of point on plateau
is a line stretch of forest
very even, with few
dead trees, quite a variety
of species. From within this
forest is rather scrubby
and disturbed. *Agave*, *Sicus*
^{*prolixa*, *Eugenia sinuatifolia*} *Guamra* are most
abundant. *Macaranga*, *Claoxylon*,
Pisonia, *Guettarda*, *Sissia*.

Heritiera, Licanthes, etc.
rare. Wikstroemia
locally common.

Trees generally up to
3-10 or less m. tall. few
over 2 dm dbh. except
Ficus, Pisonia etc.

Dec. 25 - Ritidian Point
in rather scrubby forest on

39265 *Hedyotis corymbosa*
in open hard ground of road.

7 66 *Wikstroemia*
locally common in shade
and in small openings.

3 67 *Wikstroemia*

8 68 *Heritiera longipetiolata* Panck.
very rare two ~~old~~ trees seen

15 69 *Licanthes nelsonii* Merr.
very rare, no tree seen

Dec. 25 south west corner of
Northwest Field, south of
Ritidian Point

4 70 *Erigeron annuus* L.
common locally

Dec. 23 - north cliffs of Achae Pt.
south of Ritidian Point.

3 71 *Balanophora*
occasional on ledges of rough
limestone

very rough limestone

165 m. flowers white.

shrub 2.5 m. tall with
long pendent branchlets;
flowers greenish yellow.
stems plant with
larger leaves.
tree 14 m. tall, 2.9 dm. dbh.

tree 12 m. tall, flat topped,
with brownish green cast; flowers
with corolla greenish white.
stamens crimson.

150 m.

erect; rays white.

150 m.

flowers ^{with red}
deep salmon pink; parasite
on *Premna obtusifolia* (a possibly
a *Triphasia trifolia*).

Dec. 25 - about 1 mi. S. of
Pith Junction
on bare coral roadside

39272

Dentella repens
common.

3

73

~~Dentella~~ *Lonyza canadensis*
abundant

Dec. 25 - top of cliffs at Maub
south of Amparaya Point
74 *Desmanthus virgatus*
rare in thin brush of
Remcaena, etc.

Dec. 27 - beach east of
Merizo

4

75 *Xylocarpus moluccensis* (Lam.)
single tree in open area
just back of top of beach.

Dec. 27 - Agfayan Bay

2

76 *Heritiera littoralis*
single tree near shore

140

prostrate; flower white
lobes toothed; fruit immature
erect, rays white.

135 m.

shrub 2 m. tall; flowers
white.

1 m.

N. Room.

tree 5 m. tall, flowers white.

2 m.

tree 3 m. tall, sterile.

Dec. 27 - Mt. Schroeder

Fire reported yesterday on south slope. Today when examined almost the entire south slope except the forested areas had burned. Several small areas of green grass still remain just below the main ridge. Fire still burning downward on southeast spur below the steepest part. On north side one very steep slope has burned and several small lobes east of this. Cannot see how far down on northeast side. Apparently the fire did not enter the wooded areas. Examined only from Merizo inner through binoculars. Grass is burned clean in some areas, in others apparently leaves burned off, leaving canes. In several areas it did not burn at all.

General notes - Typhoon Lola defoliated most trees south of north end of N + S again. Largely leaved out again by now. Many trees blown down in most parts of island, even in protected places. Several trees seen with trunks snapped off 2-3 m. from ground. Branches broken in large numbers. *Artocarpus* seems to be the most frequently damaged. Though *Ficus prolixa* is blown over to some extent. Mangroves at Merizo not injured visibly, nor *Nipa* at Marapan.

Bidens pilosa var. *radiata* has spread over the entire northern half of the island, is locally abundant and very hard to control.

Wild *Carica papaya* is still fairly common but was nowhere seen in any abundance.

Trees blown over by typhoon have spreading but very shallow root systems not penetrating limestone significantly.

Dec. 28 - Kwajalein I. Naval
Air Station 2 m.

39277 *Chrysopogon aciculatus*
large patch in lawn,
somewhat protected and
semi-shaded

77 *Caesalpinia major* (Noddy) Dandy
solitary individual Excl.
at top of beach in full sun

Erosion ramp near
terminal very low, pitted
with ~~flat~~ small potholes
which tend to be in rows
perpendicular to beach, but
tending to coalesce into rows.
Lawn near terminal is
a mixture of *Dactyloctenium*,
Desmodium canum, *Fimbristylis*,
cymosa, *Lepturus*, *Thunbergia*,
Vernonia cinerea, *Eragrostis*,
amabilis, *Phyllanthus amarus*,
Chrysopogon, *Euphorbia prostrata*,
Euphorbia thymifolia, *Cenchrus*,
echinatus, *Heliotropium*,
ovalifolium, *Synedrella*,
Tachytarpheta indica, the
last three uncommon.
Casuarina vaginatum
common near beach.

prostrate forming a
tight mat, fruiting
culms ascending to erect.

Hawai, probably cleared for pasture. The pale green patch in Kaula gap could be grass, not clearly accurate as distance is too great for clear view.

In Hawaii along Kohala coast large areas of sugar cane on north and northeast slopes. Some conspicuous grassy areas below coast and above cane also on first ridges between gulches. Forest on plateau looks in bad condition in some areas toward north. Tall trees rare. Not so southward. Much Aesculus at upper middle altitudes on valley walls.

Along Hamakua coast is a strip of forest above cane belt and below Parker Ranch pasture.

In cane belt there is characteristic pattern of wooded ravines and some narrow ridges running down slope. Ravine lines on north sides with rows of Casuarina.

Belt of pasture extends clear across middle east slopes of Waianae above a narrow Koa belt

which is above a wide lehua belt which is above a cane field. Apparently most of upper Koa belt has been destroyed for pasture. Above this reddish cinder (?) slope with thin brush.

Toward hills the ravine walls in cane belt are not lined with Casuarina but are normally wooded. At lower edge of forest belt are some conspicuous fairly large patches of dark colored forest, probably planted.

1953

swain 27

Jan. 3 - Kilanea Military Camp
along trail in sparse vegetation
on ash beds

39279 *Scleranthus* *stipularum*
west side of

Jan. 4 - ~~at~~ South Point, Kalae
Low vegetation on windswept
plain and ^{low} cliffs over sea
Portulaca cyananthes in
on ^{volcanic} ash between rocks of road
~~and on flat~~

4 81. *Portulaca oleraceae*
on ^{volcanic} ash between rows of
road cut and on flat

3 82 *Parriflora foetida* L. yellowish disc
common on road cut cliffs.

4. 33 *Jacquemontia sandwicensis*
common in

2 84 *Portulaca cyanocephala* L.
common in flat grassland

Jan. 4 South Point Palao near Lighthouse

4 85 *Limbristylis cynosuroides* (L.)
in crevices on beach grass
just above reach of ~~low~~ waves

4 80 *Desbaria tomentosa*
occasional n/flat esp. soil
just above sea

2 37 Heliotropium curassavicum
on basalt bench just above sea

4 23 *Fimbristylis cyneboria* R.Br.
very common on 1000-1500 ft. of rocks cut by salt spring

Jan 4 - South Point

Lava terrace about 5-8 m.
above sea - rough surface
with bed of ash removed
for 30 m. or so back from
edge. On lava surface

Fimbristylis is only plant
on outer half. Then *vacuum*
Sporobolus virginicus, *Lescurium*
etc. back where there
is some sand & ash.

Main level of terrace
of the terrace is a plain
of yellow lava ash, a
fine dust-like layer
1-2 m. deep on the flat surface.

This plain is the surface
of most of the south point
peninsula bounded on
the east by a rough lava
flow. The lava flow
has *Cucurbita*, *Lantana*,
Lida *Four* and *vacuum*
in *vacuum*, not too high
vegetation. The ash plain
is covered by *Sporobolus*, *Lescurium*,
vacuum and
various other low *vacuum*
species. In the center
plain is only a few
small *vacuum* trees &
bushes. In the edges
above the exposed lava

surfaces, where the
ash has been cut away
by the sea, *Lescurium*
protulacastrium var.
is common. *Boerhaavia*
also.

On the way back
from South Point to Llanes
the vegetation soon
becomes scrubby and
is mainly *Lantana*,
about 1 m. or so tall,
with grassy openings,
and is grazed. The
Lantana benefits from
the grazing and has
almost covered some
areas. After this, toward
the main road, there
is a taller scrub of
Lehmannia *intertextilis*
with some *Prosopis* *Engelmii*
from the ~~sea~~ junction.
With the main road
for some miles is
mainly sugar cane
but with small patches
of *eleusine* and larger
areas of *Lehmannia* and
other mainly introduced
shrubs and small trees.
and areas of *Eucalyptus*
On lava flows is *Dodonaea*,
Strophelia, *Mysoreum*, *Wikströmia*.

37287 *Lesqueris portulacastrum* var. *gracile*
common on bare & acidic forest
ash soil near sea

2 90 *Cuscuta sandwicensis*
rare on sides of flat near sea

3 91 *Boerhaavia*
occasional on flat near sea

Jan. 3 - large flow just east
of South Point, Kalahe

3 92 *Portulaca cyanosperma* E. & S.
local on accumulations
of ash soil

4 93 *Bidens cynapiifolia*
very local around
abandoned military installation

Jan. 4 northeast of Pahala
on main highway, 20 mi south
of Kilauea

~~locally~~ on roadside

3 94 *Bidens pilosa* var. *sativa*
locally common

4 95 *Euphorbia*
abundant

prostrate, stems green;
leaves fleshy, not lustrous,
flowers white.
pale yellow flowers white
on fleshy pedicels
prostrate, leaves rather
fleshy, white beneath,
lustrous above, flowers white.

prostrate, leaves terete.

-minor (1st), shaft

erect, to 0.8 m. tall, branched,
leaves conspicuous, white.
prostrate, gland appendages
white.

Jan. 5 - Road from Kulani Prison
Camp to Weather Bureau Station

7 mi. above camp - 6800'

Open area in scrub ~~Pelua~~
~~for~~ woodland - with
sparse scrub of Geranium,
Dodonaea, Styphelia, Vaccinium
Coprosma erubescens, ~~Pasbanti~~
Several sterile grasses.
Hypochaeris is the only
exotic plant apparent here.

This scrub continues into
the woodland.

The geraniums seem to be
a hybrid swarm in *G. cuneatum*
between var. *cuneatum* and
var. *hypoleucum*.

Last shrubs seen between 9000 & 9500'.

Base black lava mosaic
of flows, both aa and pahoehoe
some weathered slightly to a
lighter color.

At 11150' at the station a
complete desert of lava, mostly
aa but patches of pahoehoe.
Three colors represented - a blackish
gray pahoehoe, a rusty dark
brown aa and a lighter brownish
gray pahoehoe. This shows
a ~~aa~~ checking of about 1" on
the smooth surfaces. No life at all.
(Get GMS map W532 dated 1951)

Pahoehoe at 10850' has
gray moss in north-facing
cracks only, grass and Pellaea
in deeper cracks or those covered
by debris facing chiefly up, but
to some extent in any direction.
The moss is very common,
the grass and fern only occasional.
(photos)

Pahoehoe crossing road at
10,800' has moss common in
same situation, grass tufts
and moss up at an estimated
10,900-11,000', to upper limit of
this exposure. (photos). Grass
only on upper part of this exposure.

Moss only on north facing
~~cracks~~ cracks, none exposed
to 4 p.m. sun. very few exposed
to 4:15 sun. No Pellaea seen on
this exposure.

10,000' On a tiny patch of ^{on} pahoehoe
~~4000'~~ in an aa field are two small
gnarled Vaccinium bushes ~~grass~~ and
Pellaea is common. Moss is common
here, to some extent even on aa.

At 9400' on a dull brown weathered
pahoehoe are a few scattered
Vaccinium bushes, these
showing great variation.
Moss here, also.

At 9200-9300 on fresh-looking black pahoehoe *Vaccinium* fairly common.

At 9100' lichens noticed. Bet. 9100 + 9200' on ~~the~~ ~~the~~ light brownish pahoehoe grass and *Vaccinium* fairly common. *Styphelia douglasii* occasional.

Fields of fresh aa. Then at 8800' + two small kipukas with thickly scattered bushes of *Styphelia*, *Vaccinium*, *Dubautia* + grass on older pahoehoe, getting over slightly into aa.

At 8700' + 8500' broad flat black glassy pahoehoe flows with scattered *Vaccinium*, occasional *Styphelia* and *Dubautia*. Many kipukas ~~at 8500'~~ of pahoehoe with abundant shrubs.

At 8300 shrubs common on rather young aa. Also first *Metrosideros* trees in kipuka here. This kipuka is large and has almost closed scrub of many species.

At 9100' first roadside weed, *Hesperochloa radicata*

The north slope of Mauna Loa is a bleak waste of interlaced lava flows of various ages. The road to the Weather Bureau High Altitude Station is a relatively recently built graded road bulldozed into the rough lava on a rather gentle grade spiraling up the mountain from Kulani around to the west overlooking the saddle between Mauna Loa and Mauna Kea. The lower part is through fine wet forest of *Metrosideros*, much of which, unfortunately, is being destroyed for grazing purposes. This forest decreases in stature somewhat upward, but irregularly, and depending on the age and character of the lava substratum. This forest ends abruptly where the 1942 lava flow cuts across it at about 6500'. After this there is intermittent woodland of low stature with scrub in the understory and in the openings. This scrub is the typical montane

(ctd. p. 162)

Jan. 5 - ^{north slopes of} Mauna Loa, road
north-east of Weather Bureau Station
bare lava flows

- 39296 *Dubautia ciliolata* var. *juniiperoides* 8800'
in small dipuka of pahoehoe 2701 m.
- 4 97 *Styphelia douglasii* (9150'
highest altitude observed, 2400 m
on pahoehoe flow
- 1 98 *Hypochaeris radicata* (8100'
highest exotic observed 2250 m
- 7 1 99 *Vaccinium peleanum* Shottsb. (9400'
on pahoehoe lava, occasional 2890 m
- 39300 *Vaccinium peleanum* Shottsb. 9400'
occasional on pahoehoe lava
- 3 01 *Vaccinium reticulatum* Sm. (9400'
occasional on pahoehoe lava
- 1 02 *Vaccinium* ~~pe~~ *peleanum* Shottsb. 6400'
occasional on pahoehoe lava
- 2 03 *Vaccinium reticulatum* Sm. (9400'
occasional on pahoehoe lava
- 1 04 *Vaccinium reticulatum* Sm. ? (10,000'
rare on small patch of pahoehoe 3075 m
- 3 05 *Pellaea ternstrofia* (10,550'
occasional in crevices in 3240 m
pahoehoe flow
- 1 06 (grass) *Trisetum glomeratum* (Kunth) Trin. (10,550'
occasional in crevices in 11
pahoehoe flow
- 8 07 (moss) *Racomitrium lanuginosum* (Hedw.) Brid. (10,550'
very common in north-facing
crevices in pahoehoe flow

- stiff shrub 0.4 m. high
- stiff compact shrub 0.8 m.
high, fruits purplish red.
- rays yellow
- small shrub.
- small shrub, berries reddish
black when ripe.
- small shrub, berries red
when ripe.
- small sterile shrub.
- small shrub, fruit immature.
red.
- small shrub.
- small tufts
- gray var. *puberulum* Hook & Wils.
det. H.A. Miller 1958

Jan. 5 - Kulani Road 8 mile
above Prison Camp
opening in ~~off~~ sparse
scrubby woodland on lava flow
39308 Carex

- 1 none in
2 09 Geranium cuneatum
abundant in sparse scrub in
1 10 Geranium cuneatum
abundant in sparse
scrub in

(Ctd. from p. 159) ~~the~~ xerophytic
scrub of *Styphelia*, *Vaccinium*
swainsonii, *Durbanthia*,
Coprosma, *Dodonaea* and
small *Metrosideros* in
varying proportions. It
is ~~first~~ open to almost or
quite closed, usually
rather sparse. As the
road climbs stretches
of bare or almost bare
lava, more often the rough
clinkery aa type, become
more prevalent and the
vegetation more and
more reduced to small
"islands" or "hipukas" in
the lava fields. These
vary from very small
to several to many acres
in extent. The vegetation
is commonly open woodland

6850'

2090 m

caespitose; perigynia green.

shrub 0.8 m. tall, petals white.
(mostly not in flower at this season)
mass collection to show
intergradation between
var. *cuneatum* and var. *hypoleucum*.

of scrubby *Metrosideros*
up to 3-5 m. tall, ~~sometimes~~
scrub such as described
above. The trees sometimes
seem to be lacking. The
highest trees and well
developed scrub on the
road are in hipukas at
8250 to 8300'. This scrub
has a number of species,
in the genera mentioned
above.

Above this are extensive
aa lava fields with scattered
hipukas of older pahoehoe lava.
Shrubs are fairly numerous
in the hipukas, only occasional
on the aa. They are mainly
Vaccinium with some
Styphelia and *Durbanthia*.
The shrubs are common on
aa only at about 8300' and

below. ~~At~~ Above this the aa is without ^{plants} life except for tufts of gray moss in pockets.

Crossing the aa fields at about 8500' and 8700' are two fresh looking black shiny pahoehoe flows of low rounded relief with a few scattered *Vaccinium* bushes with occasional *Styphelia* and *Durbania*. At 8800' are two small *kipuka* ^{pahoehoe} with fairly abundant shrubs of the same three genera and tufts of grass (*Trisetum*?). This vegetation is mainly on the pahoehoe lava but slightly invades the aa around the edges. Above this are broad fields of fresh aa. The last lichens were noticed at about 9100'.

Between 9100 and 9200' on light brownish, weathered pahoehoe *Vaccinium* is fairly common *Styphelia doluglasii* occasional.

Between 9200 and 9300' *Vaccinium* is fairly common on a fresh-looking black pahoehoe. Above 8800' these shrubs are

at best widely scattered, but up to 9300' on pahoehoe a number of individuals will likely be in any field of vision. Above this they are very local or absent. At 9400' a population of about 6 individual *Vaccinium* shrubs is seen. The gray moss is common here ~~on~~ in north-facing cracks.

At about ~~9500~~ ^{10,000} on a tiny patch of rather rough pahoehoe were two small gnarled *Vaccinium* bushes. The highest woody plants seen on the road. *Pellaea ternstroffii* is fairly common here in crevices. This is also the highest spot where moss was seen on aa lava, which surrounded the patch of pahoehoe.

From here on up to 11,450' is mostly aa lava with occasional exposures of an older pahoehoe, this checked and cracked somewhat, the cracks showing up because of an efflorescence of a white mineral. On an exposure of this at 10,550' a gray

moss is very common in tufts in north-facing ~~cracks~~ ^{crevices}. *Pellaea ternifolia* and *Trisetum* are occasional in very small tufts in ~~cracks~~ ^{of} any exposure but mostly exposed upward. There ~~are~~ ^{are} either quite deep or are covered by an accumulation of small rock debris which protect the root crown and ~~the~~ rhizomes from undue desiccation.

On a ~~total~~ ^{similar} elongate plateau exposure ~~the~~ ^{crossing} the road at 10,900 the same moss is ^{again} common in ~~the~~ north facing crevices. It was noticed that none of these tufts were exposed to the direct sun at 4:00 p.m. (Jan. 5) but some were beginning to be hit by the sun at 4:15. Following up this exposure to its head tufts of *Trisetum* were seen near the top at perhaps 10,950' or 11,000' but no *Pellaea*. Another such exposure continued on up the slope beyond a short stretch of aa, but

time was not available for examination of this. In all probability, at least the moss would have been present there, as it showed no signs of becoming scarce or less vigorous to the top of the lower exposure.

However, on plateau of similar character just above and beyond the Weather Bureau station at perhaps 11,140' to 11,200' no plants at all, not even mosses, were seen.

Time was not available for exploration farther up the mountain.

The interesting thing about all of these ~~plant~~ ^{plant} occurrences was that there seemed to be no ~~relative~~ ^{ecological} dependence whatever. The moss, grass, fern, and shrubs occurred in separate niches or isolated examples of the same niche. The moss did not seem in any way to prepare or prepare the way for the higher plants nor the ferns and grass to prepare the habitat for the shrubs. Cracking of the lava seemed to be the only

This is the result of either irregularities in vegetation or irregularities in preparation of the habitat.

Jan. 6 - Kilauea Volcano

39311

Galinsoga parviflora Cav.

2

in streets of military camp

3

12

Andropogon

floor of crater near Halemauuma

Melinis minutiflora has become common along roadsides generally and even on the crater floor.

Pullostylis capillaris is general on bare ground, at this season the culms are a dull orange color.

Andropogon sp. is common along roadsides and scattered on crater floor.

Hypochoeris is conspicuous along roadsides.

Along Volcano Road between Kilauea and Hilo are a great variety of exotic trees and shrubs. Below Mountain View what appears to be *Melochia* or *Heliconia* is abundantly flowering. Locally almost dominant in forest. Trees to 30' tall, leaves whitish, especially the young ones. Flowers pink.

South slopes of West Mauna are only thinly vegetated to a considerable altitude, at least $\frac{3}{4}$ way to summit, especially on ridges.

1-20 m.

dark yellow, rays white.

~~1-20 m.~~

1-20 m.

small clump, very erect.

On Mauna Loa the *Metrosideros* and *Acacia* *koa* do not form clear belts. *Koa* is very common just above Kilauea, forming forest, as above Bird Park, and *Metrosideros* is dominant in forests above Kilauea up to limit of forest though there is a patch of large *koa* at about 5,000'.

On the rainy side of Kilauea *Cibotium* forms a conspicuous understory in *Metrosideros* forest.

Jan 6. flight Hawaii to Oahu.

East slope of Kohala Peninsula grassy above, more and more wooded with *Prosope* (?) below, in places back of shore a closed forest, thinning out upward and northward along shore.

West and north slopes of Kahoolawe grassy and sparsely covered with *Prosope*, especially in ravine. North part of plateau mostly bright red and bare.

South slopes of mountain on Lanai have considerable bare or almost bare areas. Some patches of dense probably planted forest on lower slopes and in gulches. Top covered by thin forest. A few large trees on ridge.

Outer slopes on east end covered by grass or *Pantano* (?) and cacti, ^{some *Pantano*} on south side grass and scrub (*Pantano*?) except for abundant red erosion scars. *Prosopis* in ravines. Flat top extensively pineapples except on ~~west~~ ^{west} end ~~and east side~~ ~~south of mountain~~. East end of mountain much more eroded than west. Patch of *Prosopis* woodland or forest on hook-shaped peninsula on south-east end.

Munro's windbreakers on ~~west~~ ^{west} end still very conspicuous but their effects not altogether clear. Long slopes on west end grassy, with some *Prosopis* in ravine.

- Jan. 2 - Manassas, planted on
grounds of old Pattee estate
- 39313 *Hedera helix* L.
climbing on old tower
- 14 ~~*Hedera helix* L.~~
~~same~~
- 3 14 *Hedera helix* L.
same
- 3 15 *Hedera helix* L.
same
- 2 16 *Hedera helix* L.
climbing on trees and
prostrate on ground

tangled woody vine,
leaves dull green, veins pale,
fruiting branches
bushy, fruit not
quite mature.

— same but fruit mature,
~~dark~~ blue-black.

— same

woody vine, sterile
branches prostrate on
ground, fruiting bushy
climbing in trees, leaves
dull green with pale veins,
fruit blue-black, fleshy

174

175

1 198



